Garmin GPS and ArcView

Updated to Version 4.3 – 4/5/04

GPS for Ologists Course

March 30, 2004; May 20, 2004

National Park Service, Alaska Support Office, GIS Team

Anchorage Alaska –

This powerpoint presentation is designed to work within an 8-hour Garmin for Ologists Course. This PowerPoint is

Essentially 4 classes in one:

1) An Overview of DNRGarmin and what it does Slides 1-7

2) Complete stepxbyxstep installation instructions and Setup for installing Version 4.3 and a Garmin Map76. Slides 8 – 23.

Special emphasis on setting Projection paramters to DecimalDegree NAD27 (common in Alaska NP's).

3)Download Session – Completion of Exercise 1. Slides 24 - 33

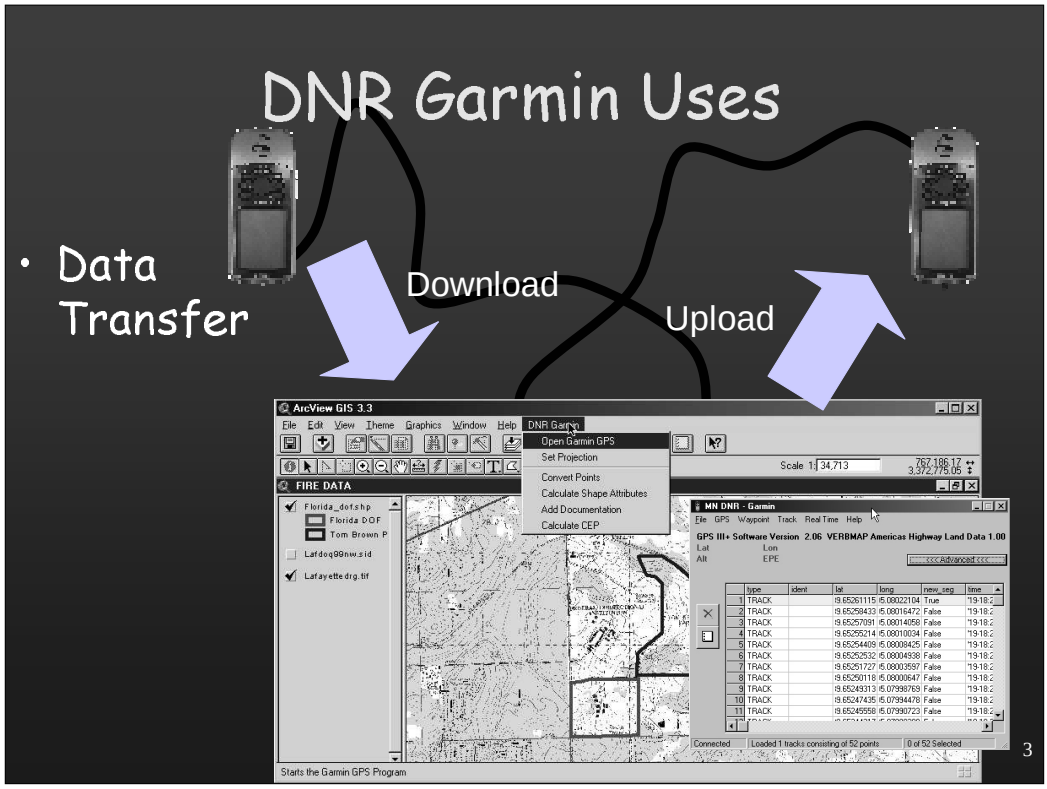
4) Upload and a Download Session - Pre-field Exercise 2, Post-field Exercise 2. Slide 35 – 57.

5) Slides 61 to End are additional Features.

Objectives

- Overview of DNR Garmin Software
- DNR Garmin: Installation and Setup
- *Post Field* Exercise 1
  - Steps to Download Waypoints and Tracks to ArcView
- *Pre-Field* Exercise 2
  - Steps to Upload Waypoints and Tracks to ArcView
- *Post Field* Exercise 2
  - Steps to Download Waypoints and Tracks

2

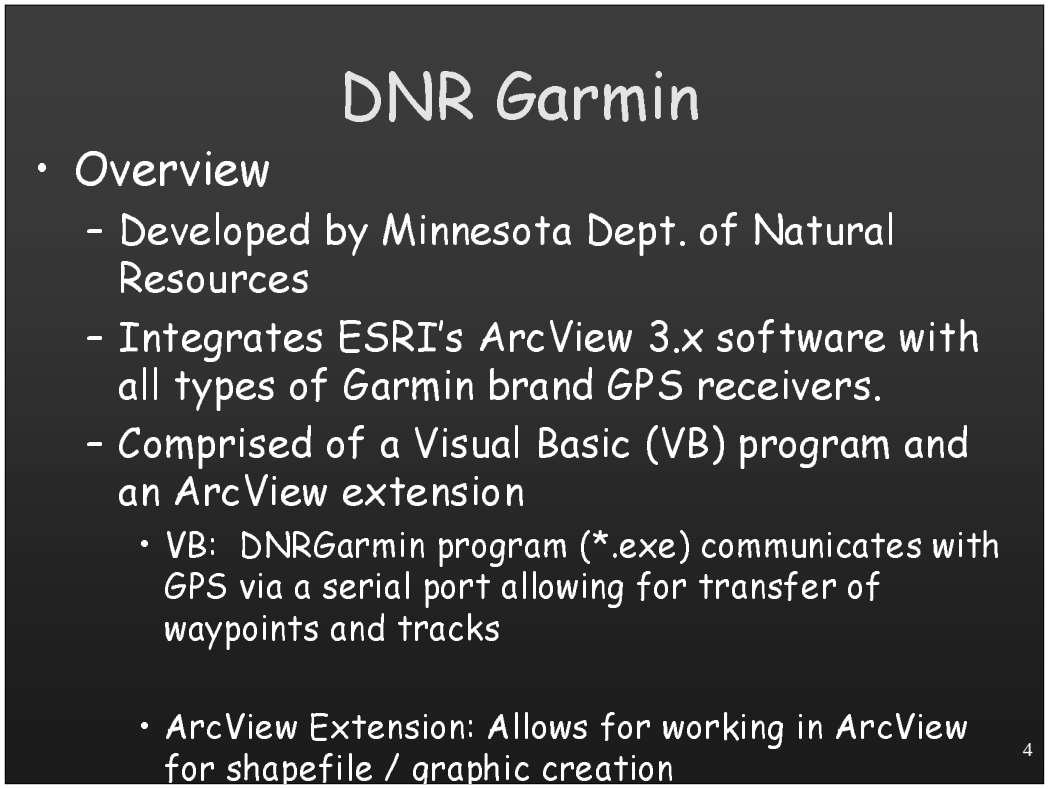


•Principle of Operation in this Class is to use DNRGarmin inside of ArcView.

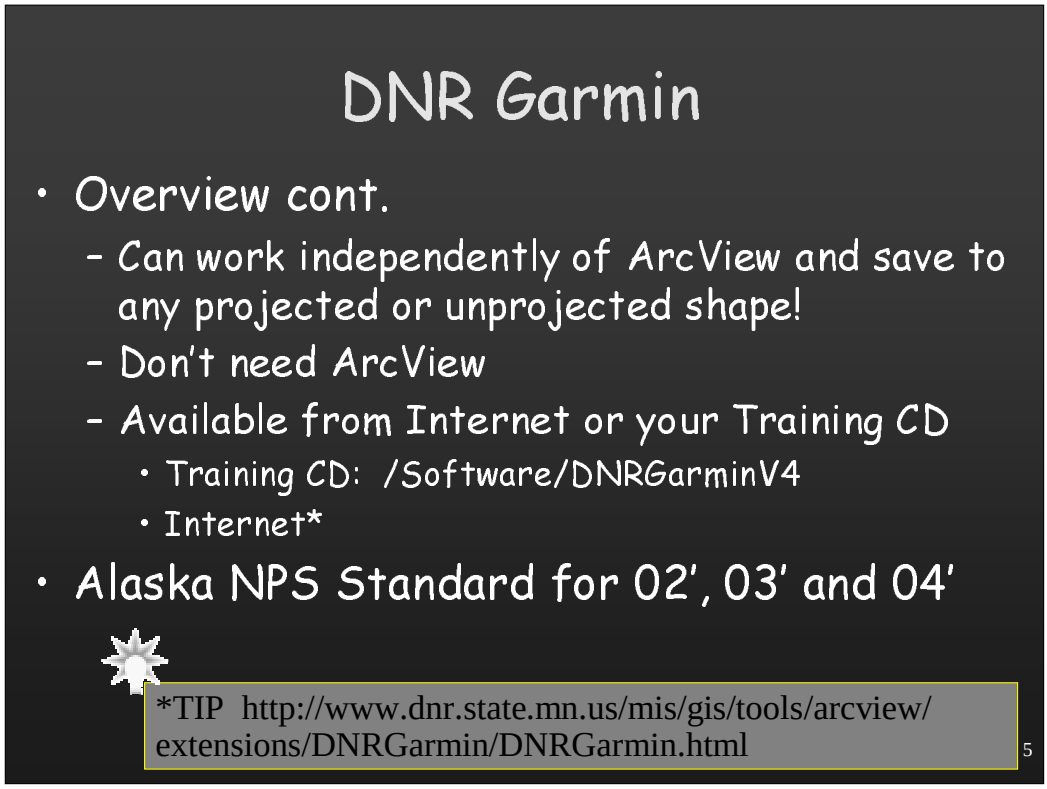
•Transfer of data out of the Garmin is considered Download. Using the DNRGarmin Interface as a stepping stone for viewing and editing of waypoint and track data.

•A Save step to save data inside ArcView

•This program also can reverse the process and allow transfer of ArcView shapefile data back into a Garmin - this is our focus for Navigation Exercise 2.



Overview
Developed by Minnesota Dept. of Natural Resources
Integrates ESRI's ArcView 3.x software with all types of Garmin brand GPS receivers.
Comprised of a Visual Basic (VB) program and an ArcView extension
VB: DNRGarmin program (*.exe) communicates with GPS via a serial port allowing for transfer of waypoints and tracks
ArcView Extension: Allows for working in ArcView for shapefile / graphic creation



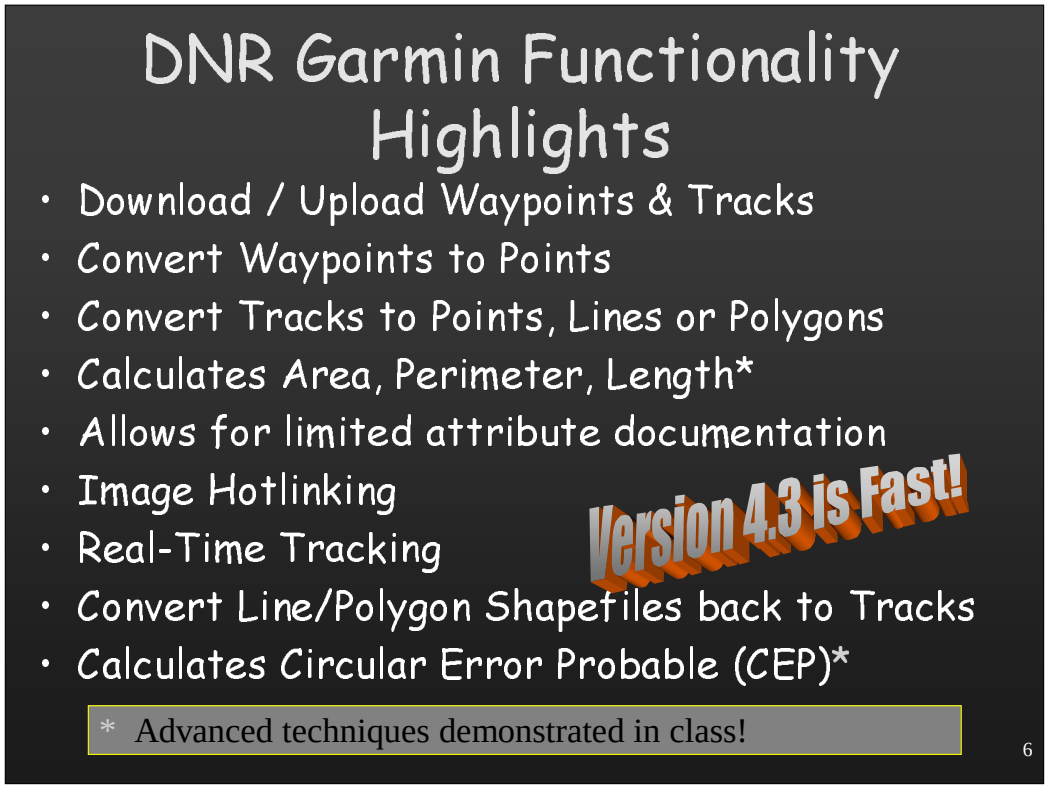
Overview cont.

Can work independently of ArcView.

New version can save to projected or unprojected shapes outside of ArcView.

Training CD: /Software/DNRGarmin

Internet*



Basic overview of main functionality -

Download / Upload Waypoints & Tracks

Convert Waypoints to Points, Lines and Polygons

Convert Tracks to Points, Lines or Polygons

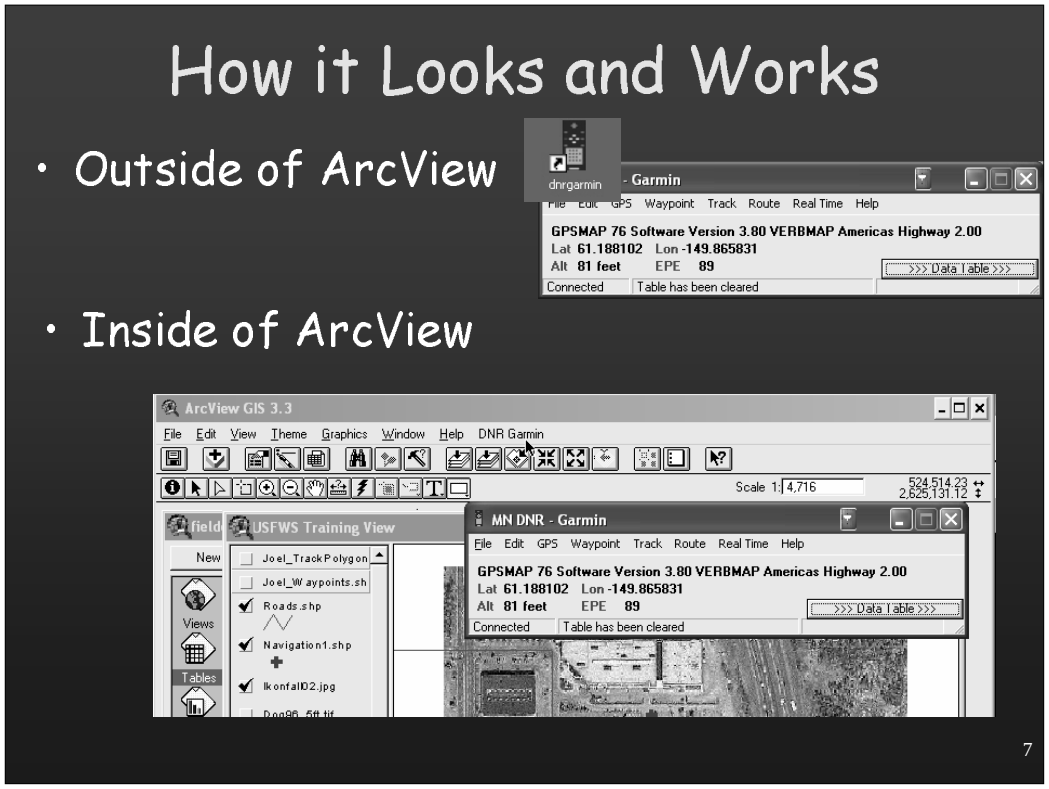
Calculates Area, Perimeter, Length

Allows for Attribute documentation

Real-Time Tracking*

Convert Line/Polygon Shapefiles back to Tracks*

Calculates Circular Error Probable (CEP)*



The DNR Garmin Extension is actually two separate programs, a VB Program and an ArcView extension. The VB Program, called DNRGARMIN.EXE is the part that communicates with the GPS receiver. The extension, DRNGarmin.AVX is used as a launching pad for the program and is also used to convert the information received into shapefiles or graphics.

Objectives:

Open ArcView project (*.apr) that contains a polygon and point shapefile

Use DNR Garmin to upload points to Garmin GPS III Plus receiver as waypoints

Use DNR Garmin to upload polygon to Garmin GPS III Plus receiver as tracks

Confirm upload to Garmin GPS III Plus receiver

*Instructor will provide name of project

Handout DNRGAR3AV.doc has all the steps outlined in setting up Garmin.

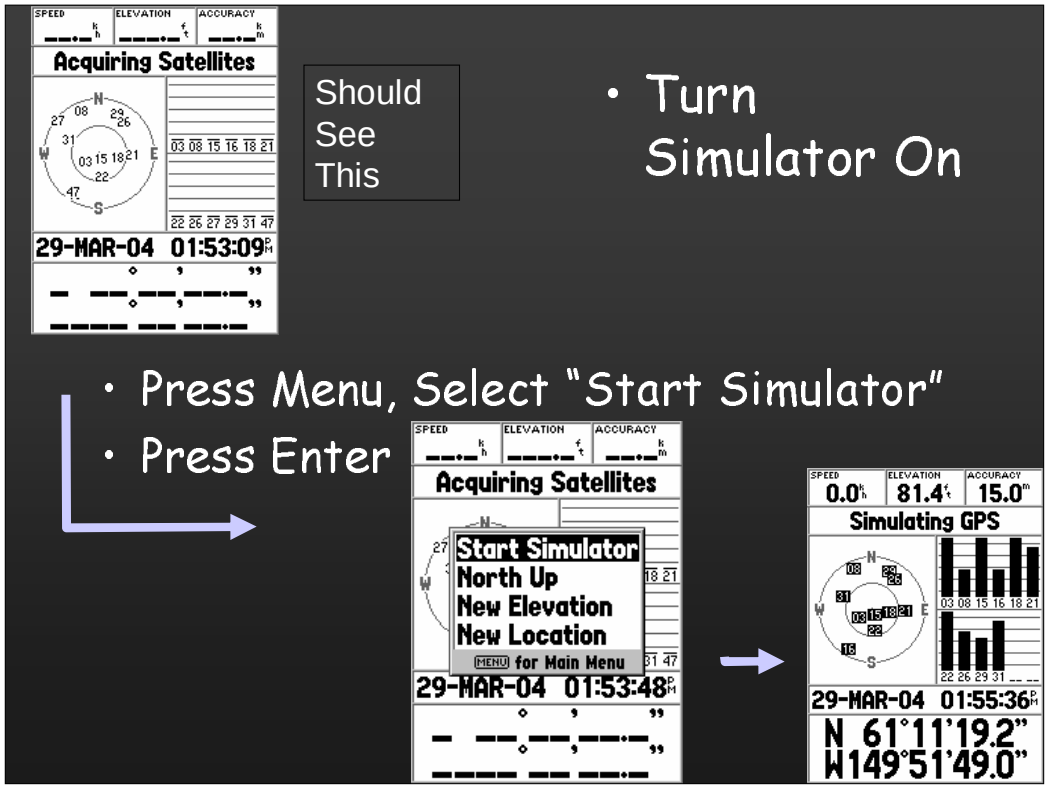
Getting Connected

- Connect Cable
- Turn on Garmin GPS
- For best results, the Garmin GPS should be connected to the computer via a serial cable and turned on before loading the DNR Garmin extension.

10

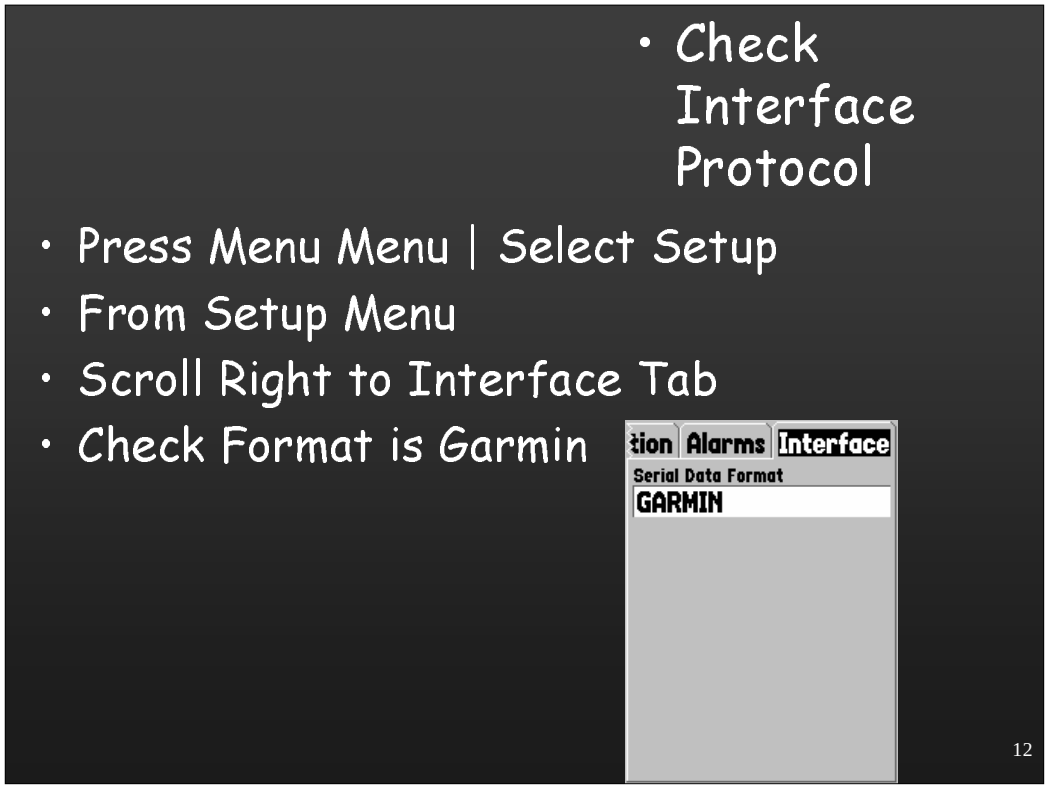
System Check

Ensure Garmin is Plugged in and On.



Steps to set Simulator Mode to ON

Important to alter this. Prevents GPS from asking “where is sky” and provides LAT/LONG/ EPE and Elev. To user.



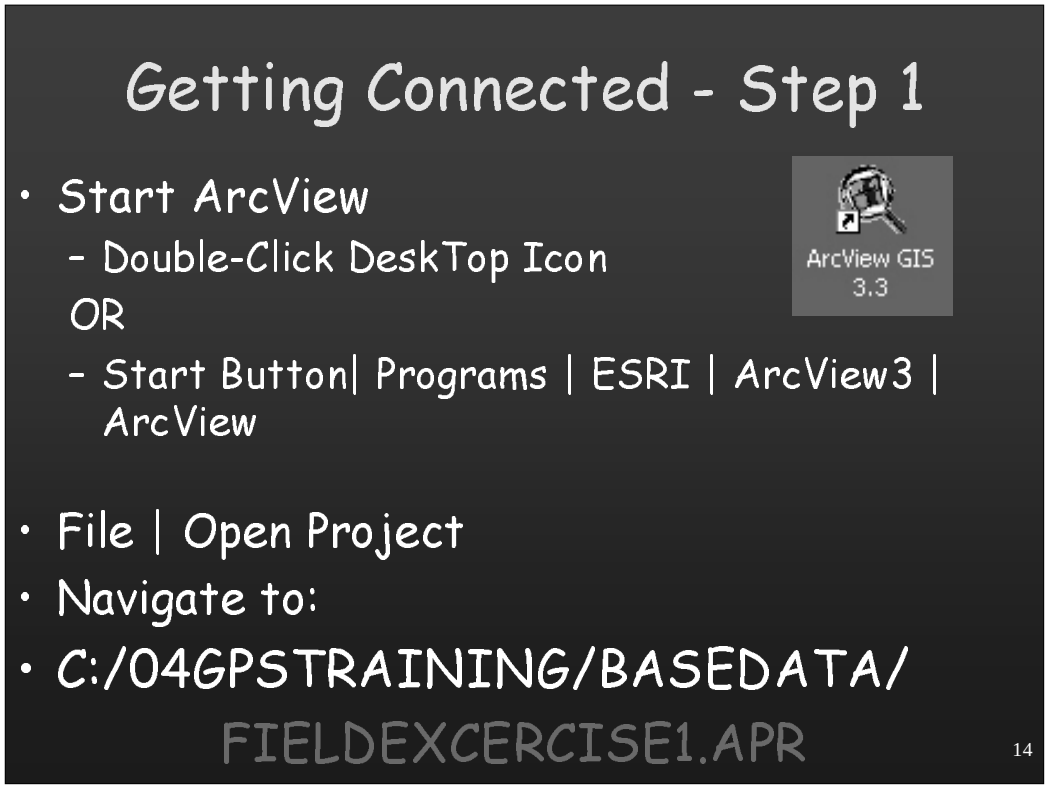
Connect receiver, start receiver and ensure interface is set to GARMIN.

Install DNRGarmin

- Navigate to <CD/Software/DNRGarminV4
- Double click "dnrgarmin43setup.exe"
- Press Next
- Press Next to Accept License agreement
- Press Next to keep program defaults
- Close Wizard
- Copy the c:/program files/dnrgarmin/ "dnrgarmin.avx" extension file to the ArcView extension folder C:\ESRI\AVGIS30\ARCVIEW\EXT32\

Already Done

13



•Step 1

•Start ArcView

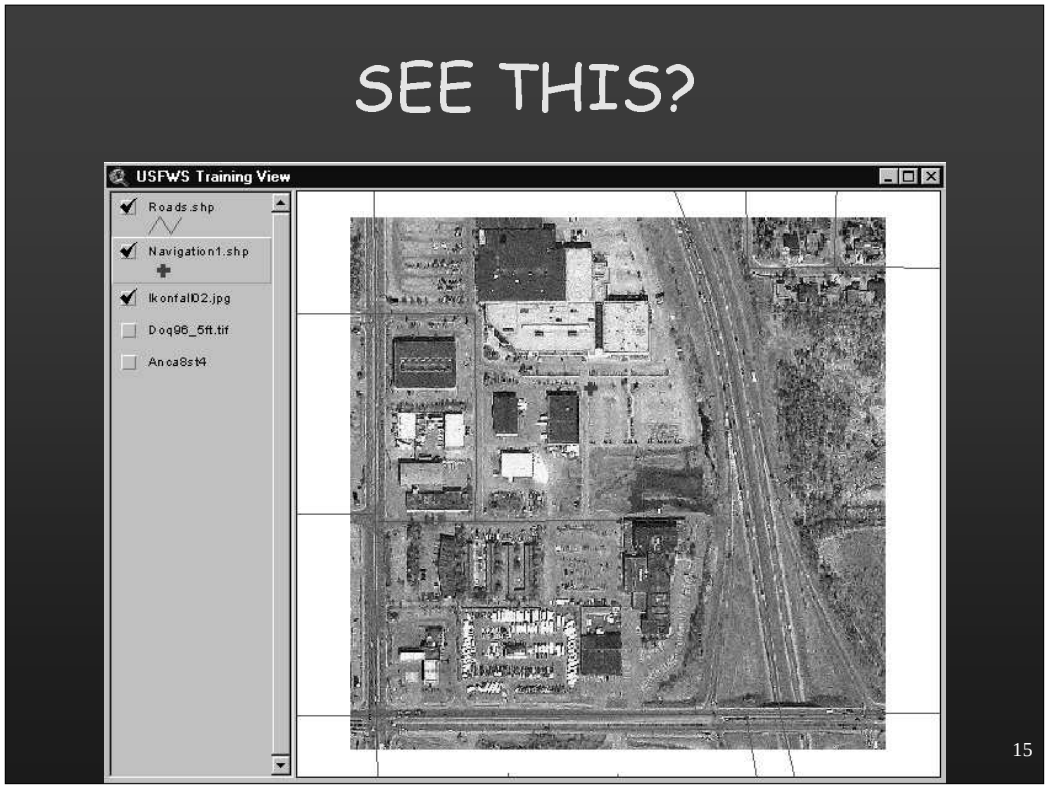
•Open a pre-made ArcView Project. For Training these can be found in

•FOR FLORIDA

•/ACTIVE_INCIDENT/FLORIDA_FIRE / BASEDATA

•FOR JOSHUA TREE

•/ACTIVE_INCIDENT/JOSHUA_FIRE / BASEDATA

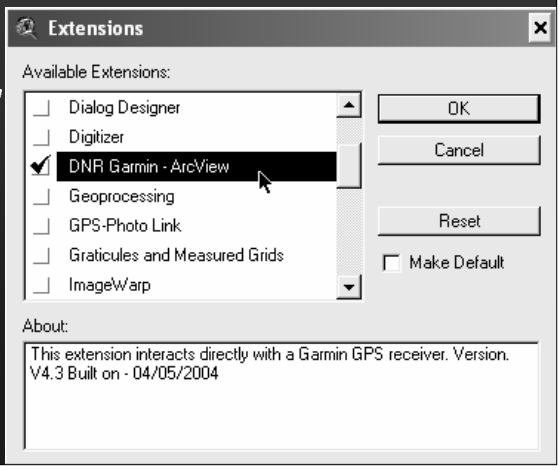


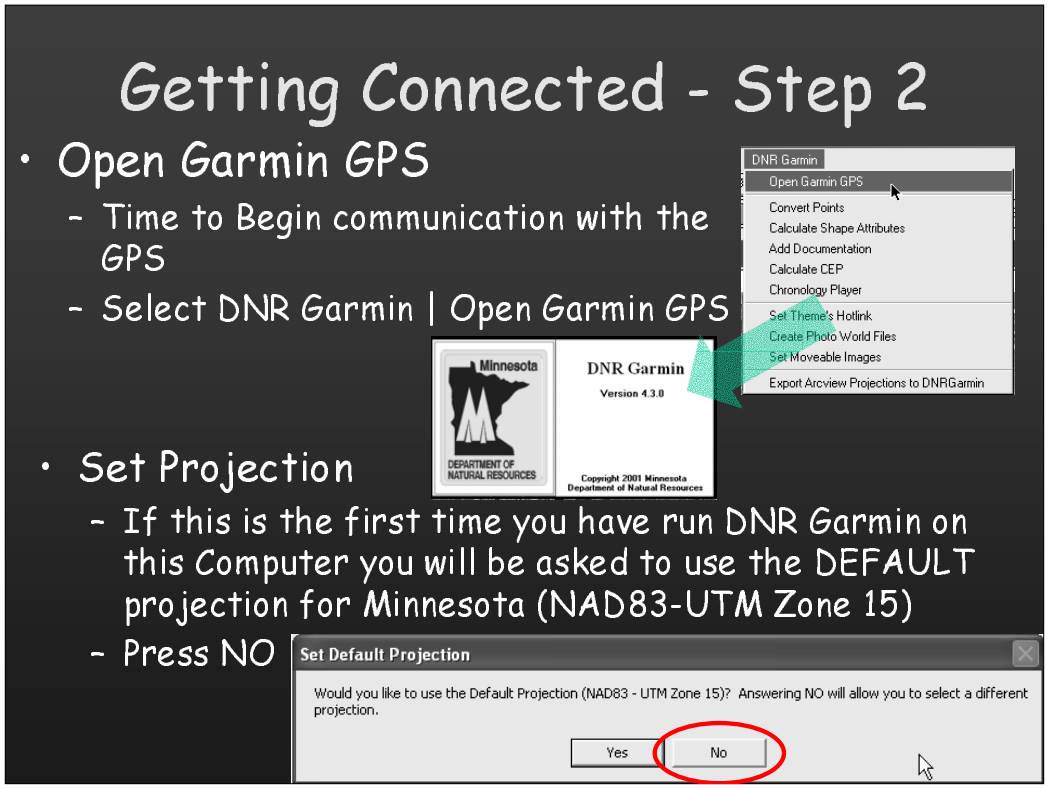
•Step 1

•Load DNR Extension

Turn on DNR Garmin

- Load DNR Extension
  - Select File | Extensions...
  - Scroll to Select "DNR Garmin-ArcView"
  - Press OK





•Instructors: Once 4.2 is installed on a PC, the Windows registry will always retain the default Code and projection. You may remove them by running REGEDIT

•HKEY Current User

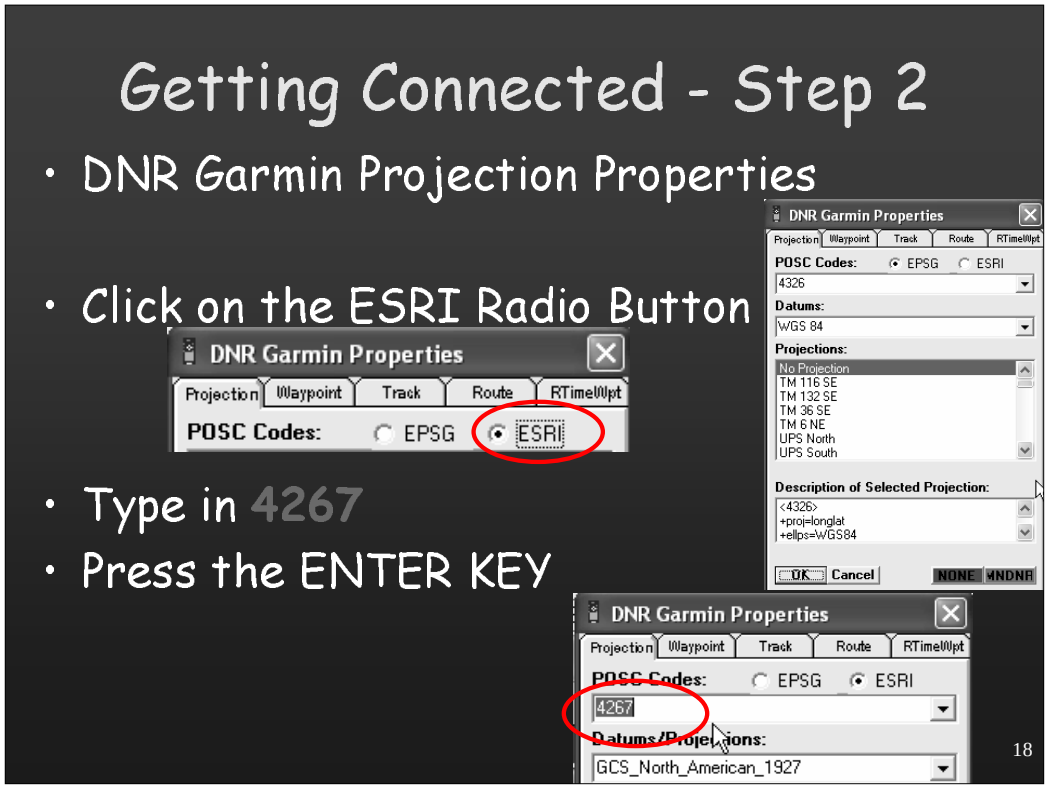
•Software

•VB and VBA Program Settings

•DNRGarmin

•Proj

- Delete the two settings (not default)



•Step 2

•Set Projection

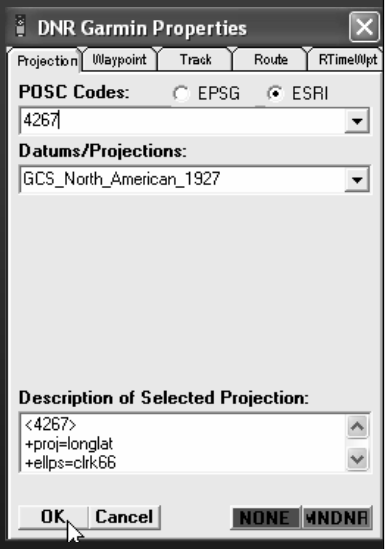
•FL will be UTM, Zone 16, NAD83

•JOTR will be UTM, Zone 11, NAD83

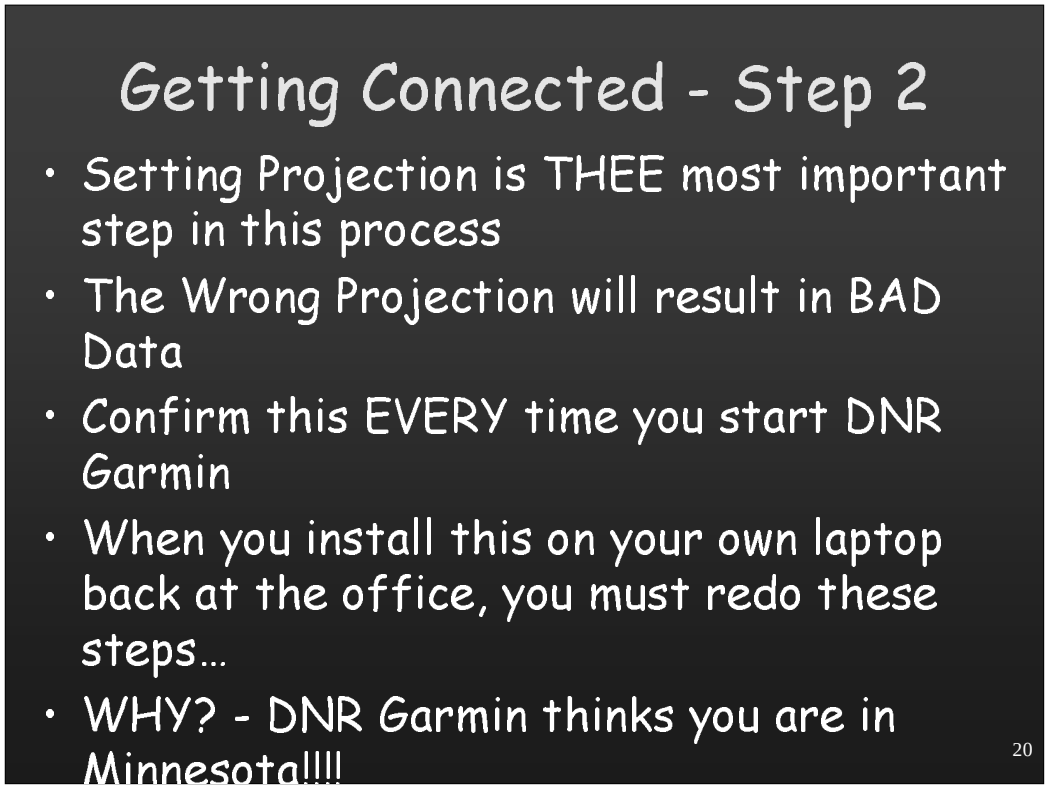
Why? Look at your ArcView project. We named the View to remind you that the other GIS data is in this projection and datum. Every "home" unit's GIS data or every incident GIST will have data in *some* projection and datum. You need to find out what that is so your GPS data lines up!

Getting Connected - Step 2

- You Should See This
- Once you check these Settings
- Press OK



19



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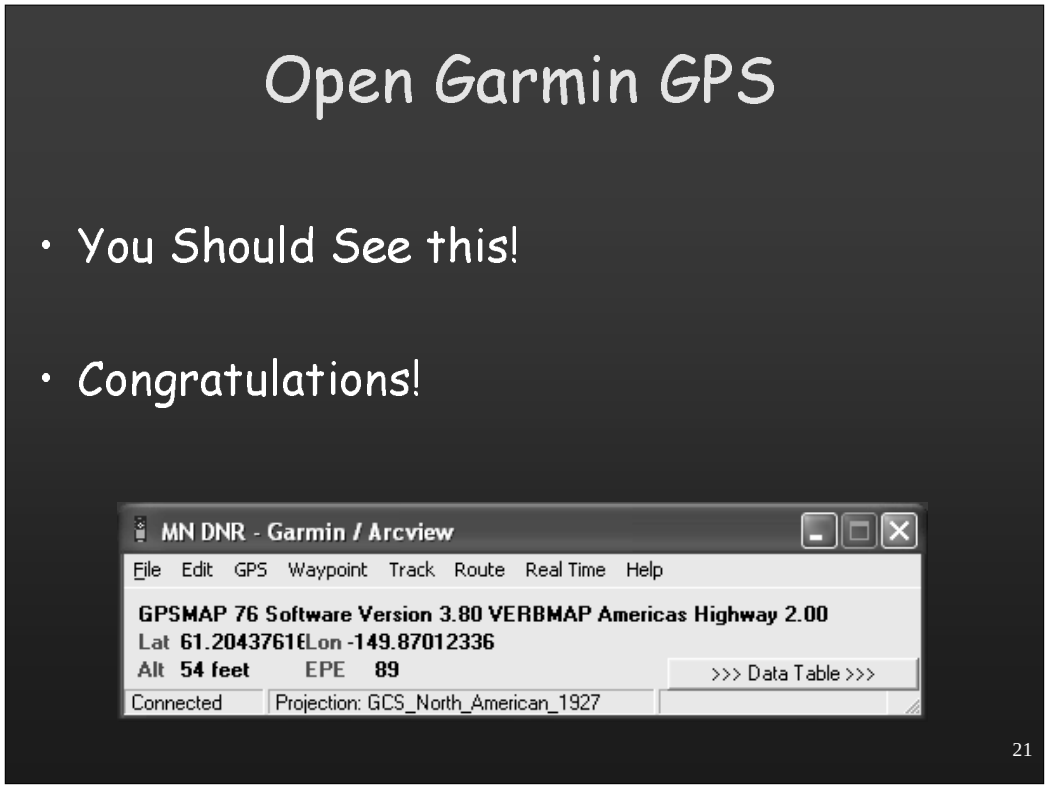
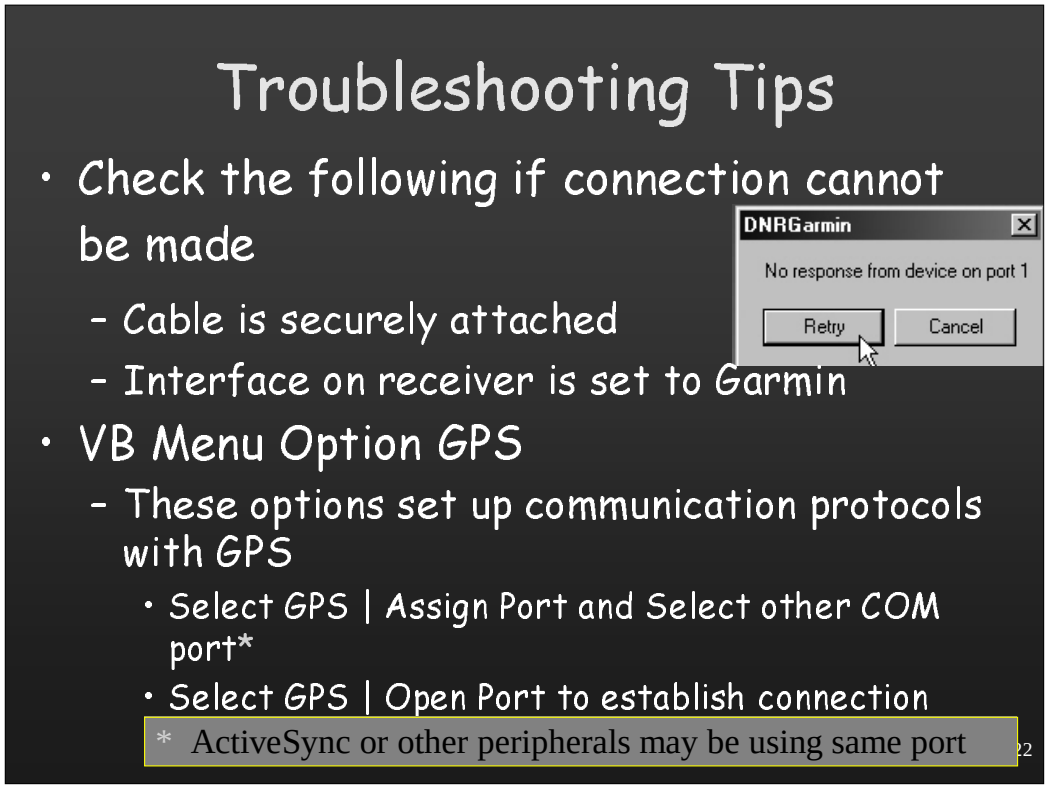


•Step 2

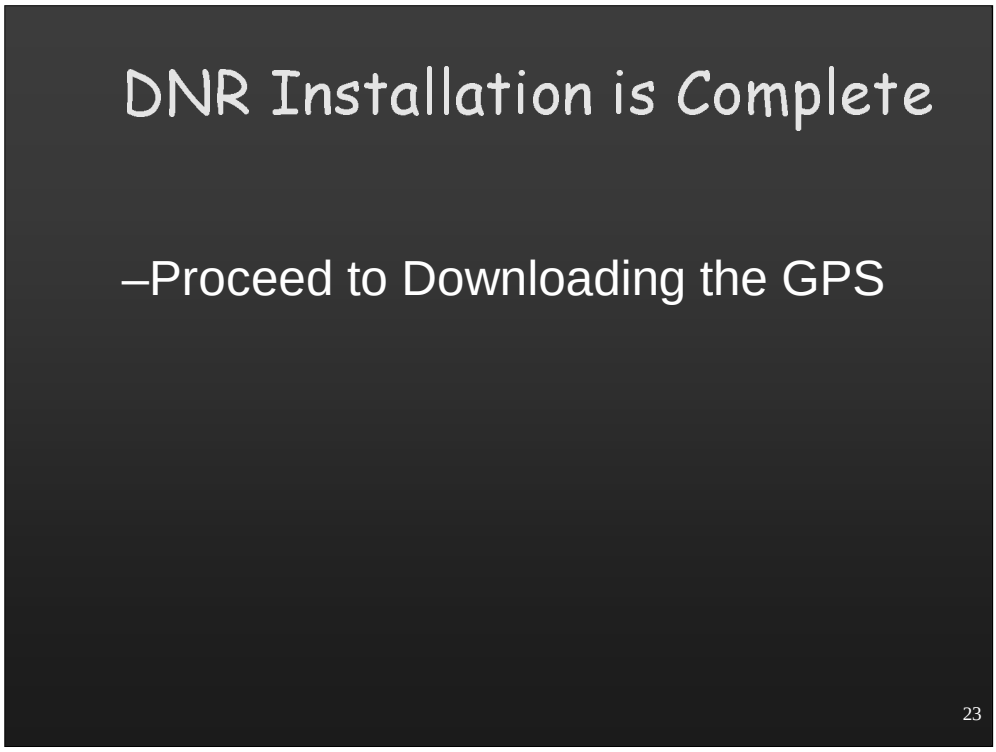
•Open DNR Garmin from DNR Garmin Menu

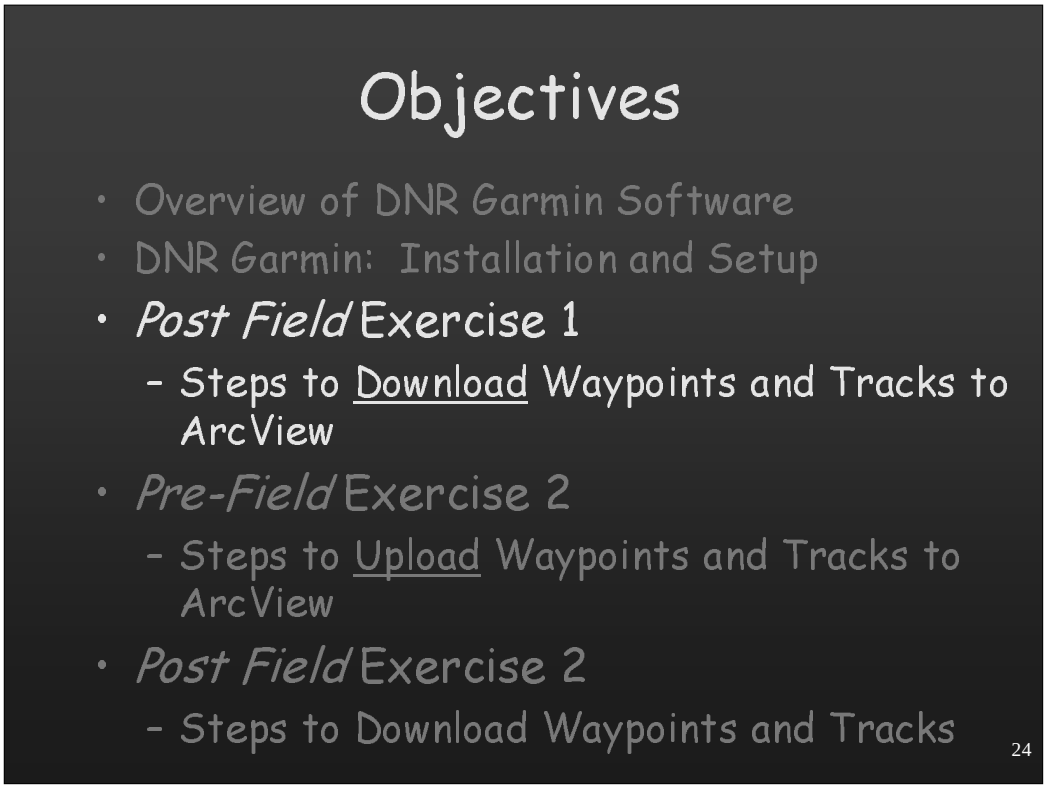
•Should get connection.



•Use this slide if there are difficulties in establishing connection.

•See instructor for special instructions.


DNR Installation is Complete
–Proceed to Downloading the GPS
23



Objectives:

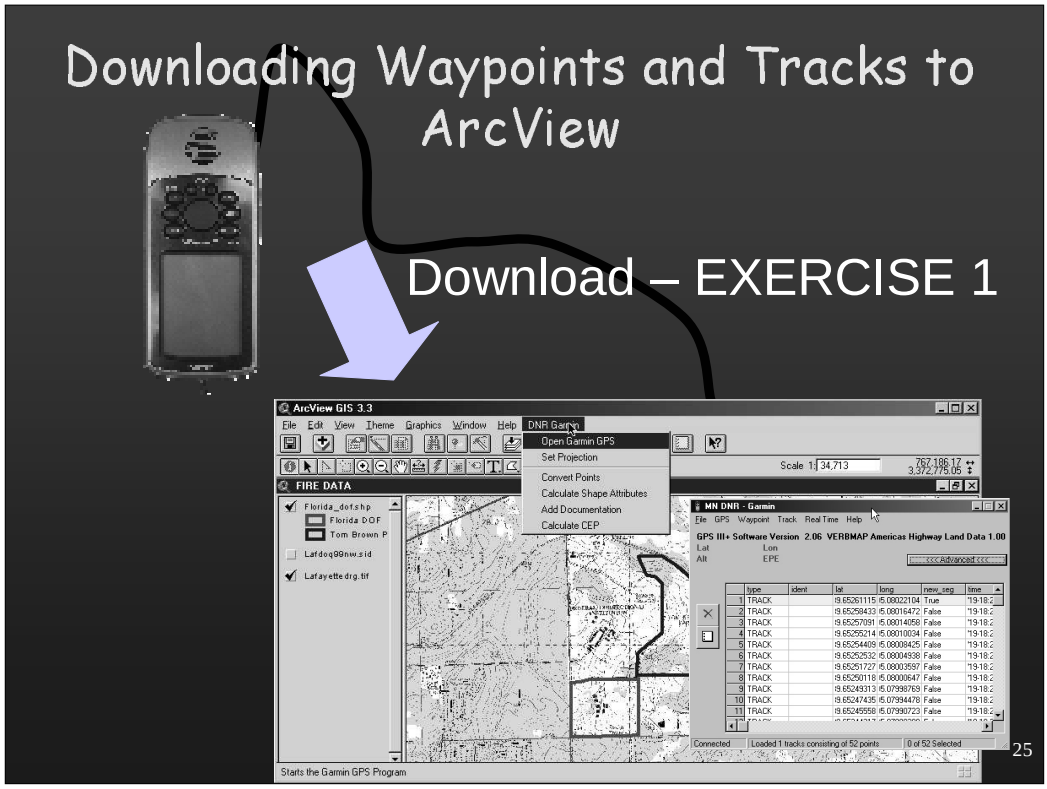
Open ArcView project (*.apr) that contains a polygon and point shapefile

Use DNR Garmin to upload points to Garmin GPS III Plus receiver as waypoints

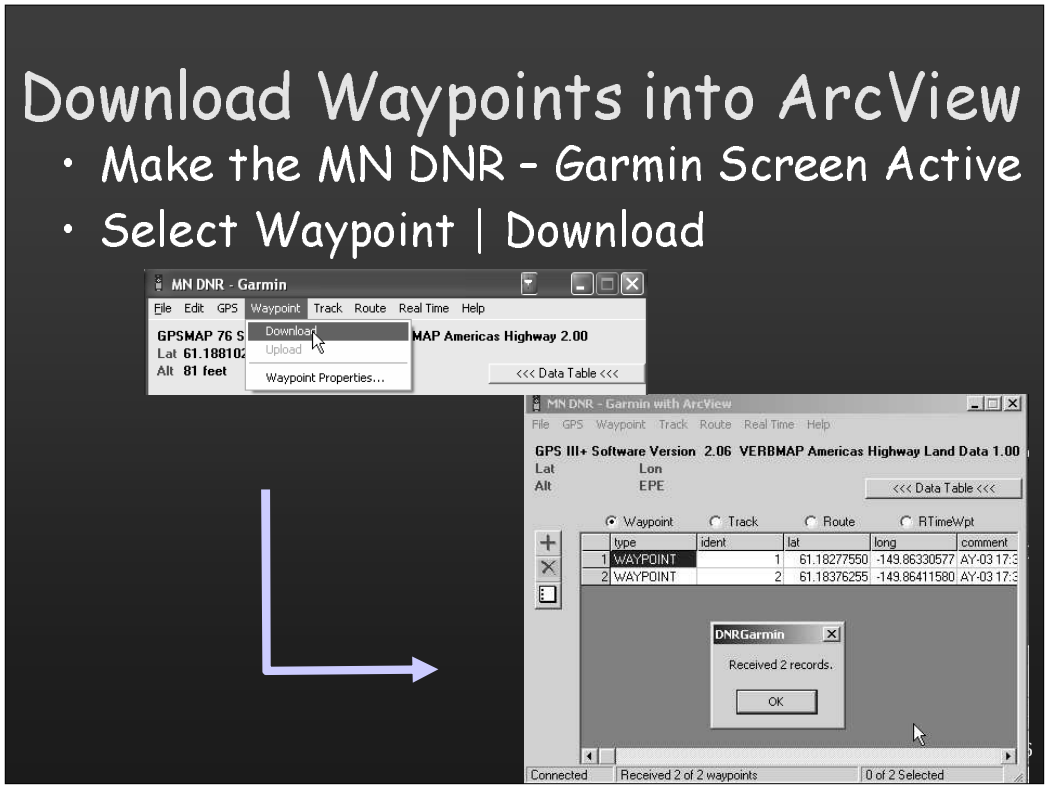
Use DNR Garmin to upload polygon to Garmin GPS III Plus receiver as tracks

Confirm upload to Garmin GPS III Plus receiver

*Instructor will provide name of project

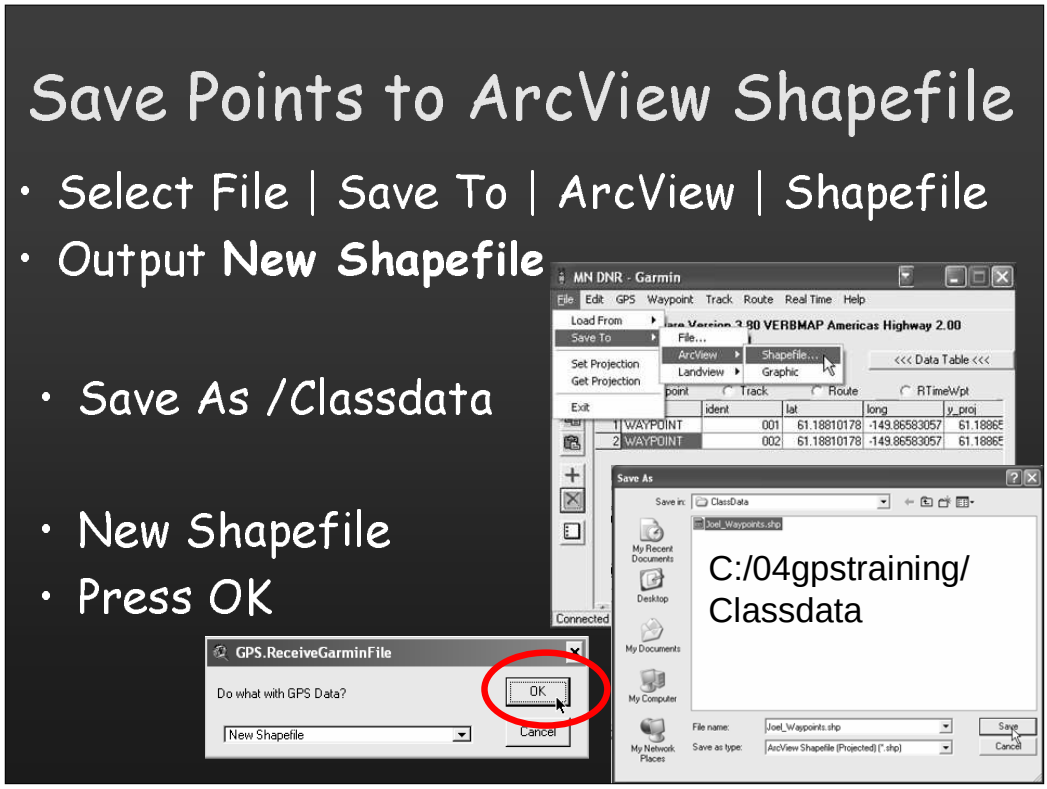


•This will complete Exercise 1. You have waypoints and tracks in your Garmin GPS. Now is the time to download and create shapes.



•Waypoint | Download

•Click on Advanced button to see a list of all waypoints and their attributes in a table



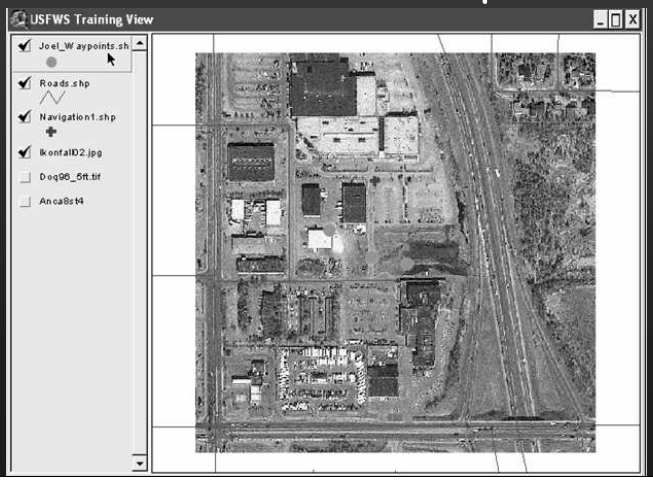
•File | Save As | ArcView Shapefile

•Give it a name using naming convention of: incident name_date (ddmmyyyy) _military time (optional)_description (what is it and what feature type).

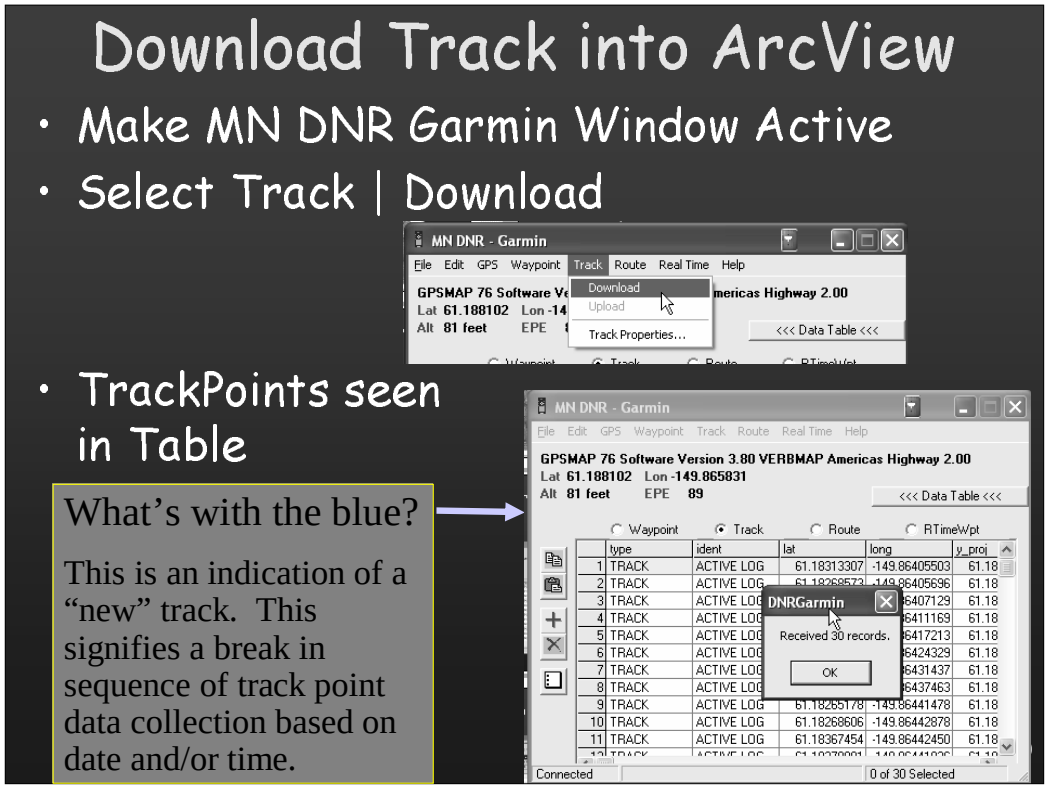
•Turn on theme in view legend

Save Points to ArcView Shapefile

- Shapefile appears in View – Table of Contents. Turn on and Explore!



28

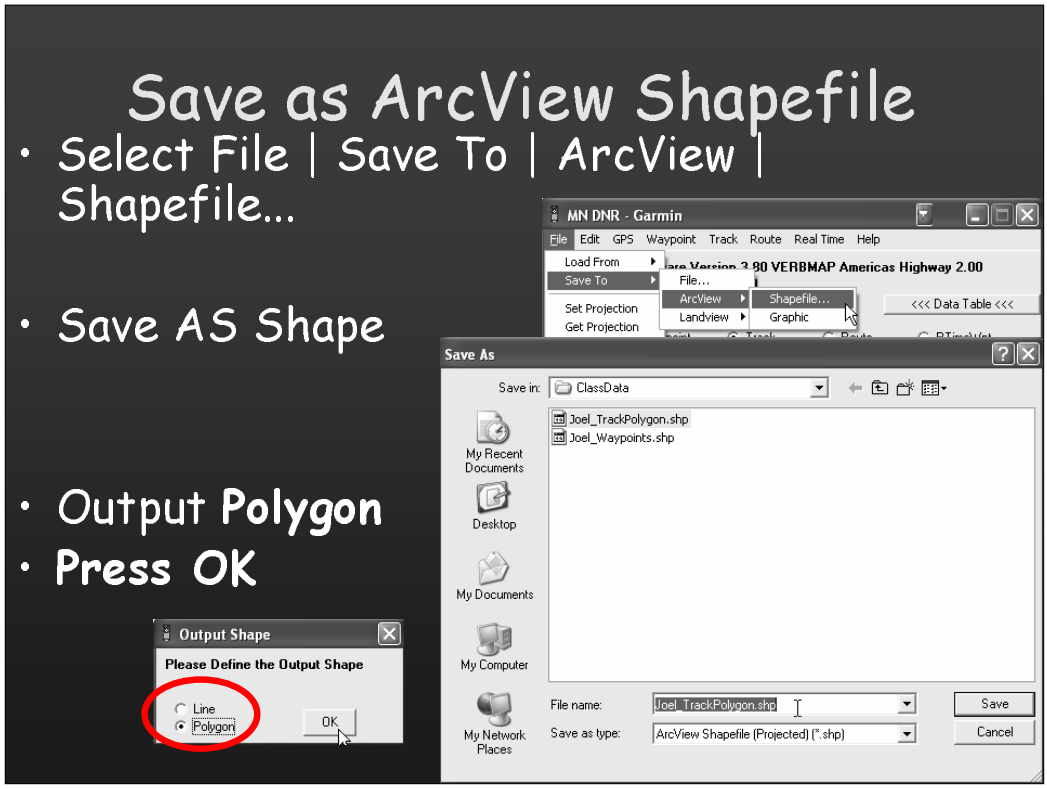


•Next Step to Download the Garmin Tracks.

•Tracks | Download

•Advanced button to show all tracks points and attributes.

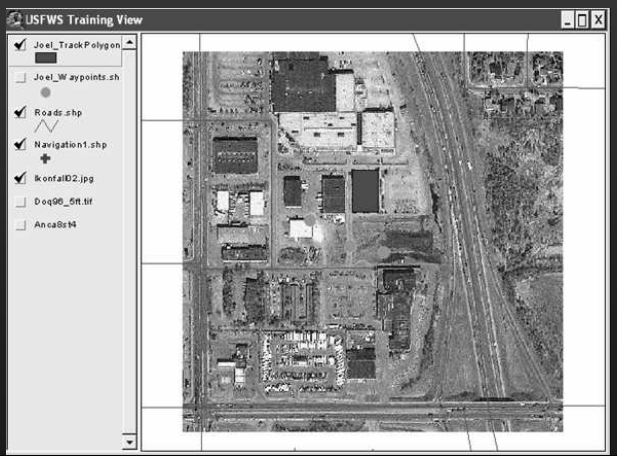
•Note that blue indicates beginning of new track. DNRGarmin decides this based on break in sequence of track point collection by date and/or time.



- File | Save As | ArcView Shapefile
- Name using some convention
- Output to Polygon
- Turn on theme in view legend

Save as ArcView Shapefile

- Shapefile appears in View – Table of Contents. Turn on and Explore!



31

Summary

- You have installed and setup DNR Garmin for the first time.
- Downloaded waypoints and at least one tracklog from the Garmin to ArcView.
- The Polygon might not be too pretty, but there are workarounds:
  - Get better with opening/closing tracks
  - Download the track as points, select records you want to convert to poly and use DNR Garmin or Alaska Pak to convert selected records to Poly!

32

Break - End of Exercise 1

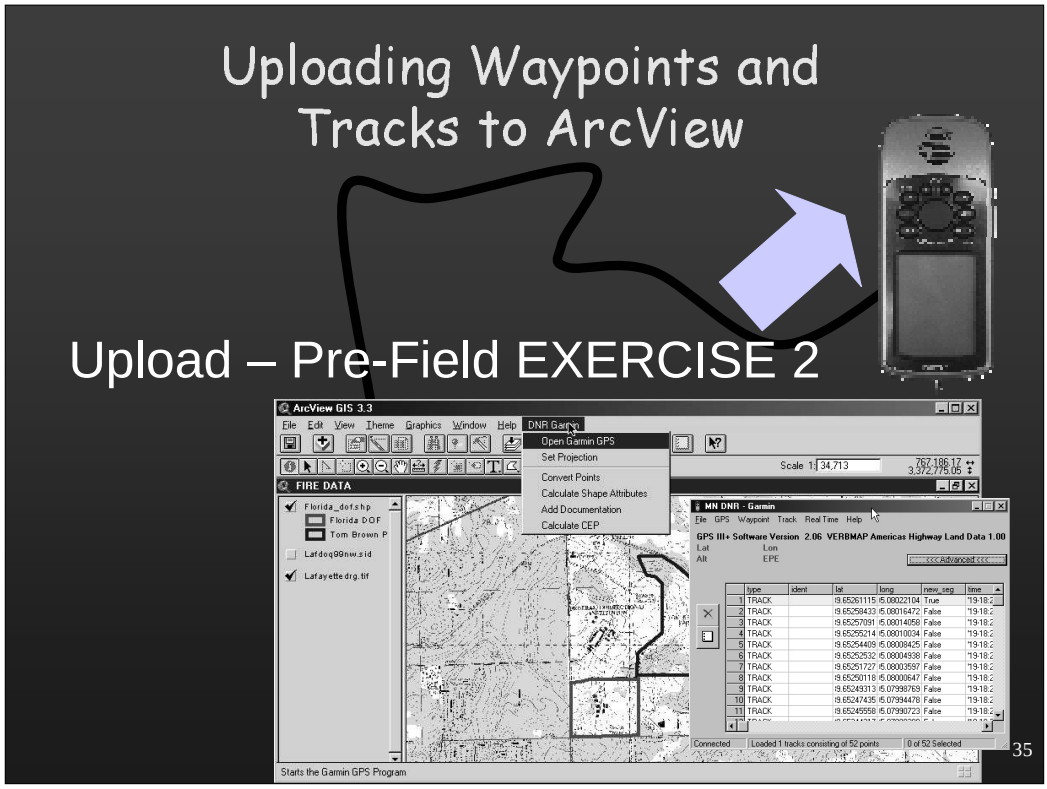
- STOP HERE
  - Close DNR Garmin
  - Close ArcView – Don't Save
- Pick up Field Exercise 2 Document and Read the Scenario
- Next Steps are to Open a New ArcView Project and Upload data

33

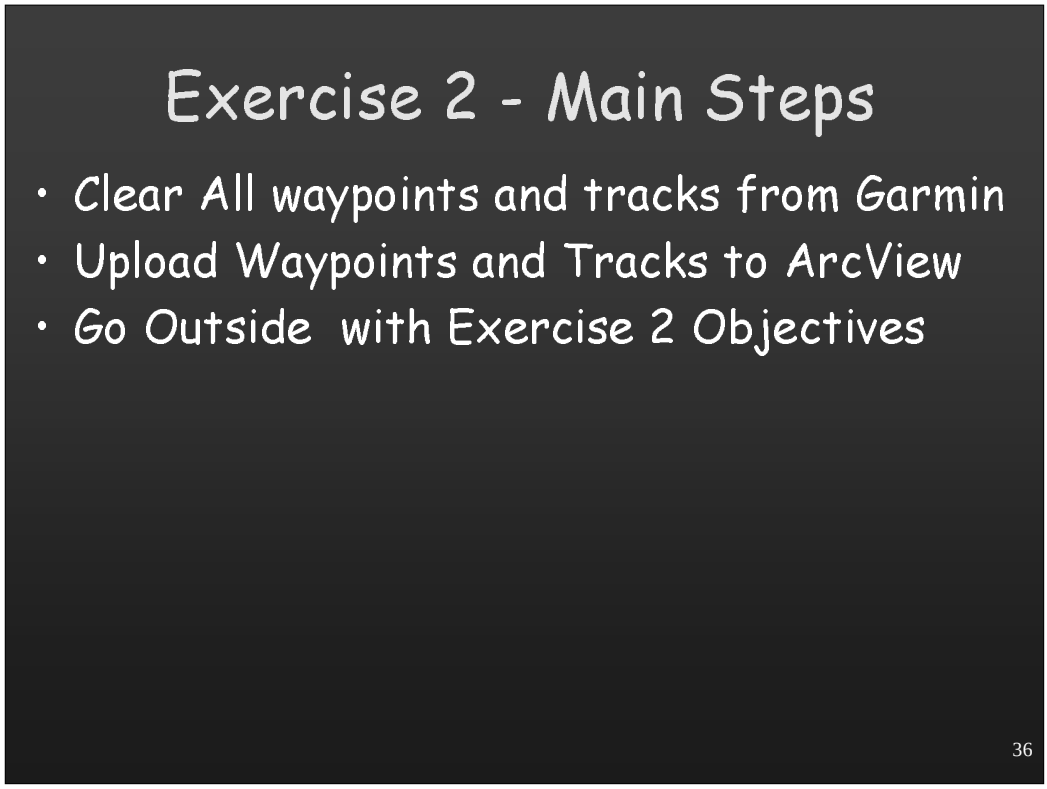
Objectives

- Overview of DNR Garmin Software
- DNR Garmin: Installation and Setup
- Post Field Exercise 1
  - Steps to Download Waypoints and Tracks to ArcView
- *Pre-Field* Exercise 2
  - Steps to Upload Waypoints and Tracks to ArcView
- *Post Field* Exercise 2
  - Steps to Download Waypoints and Tracks

34

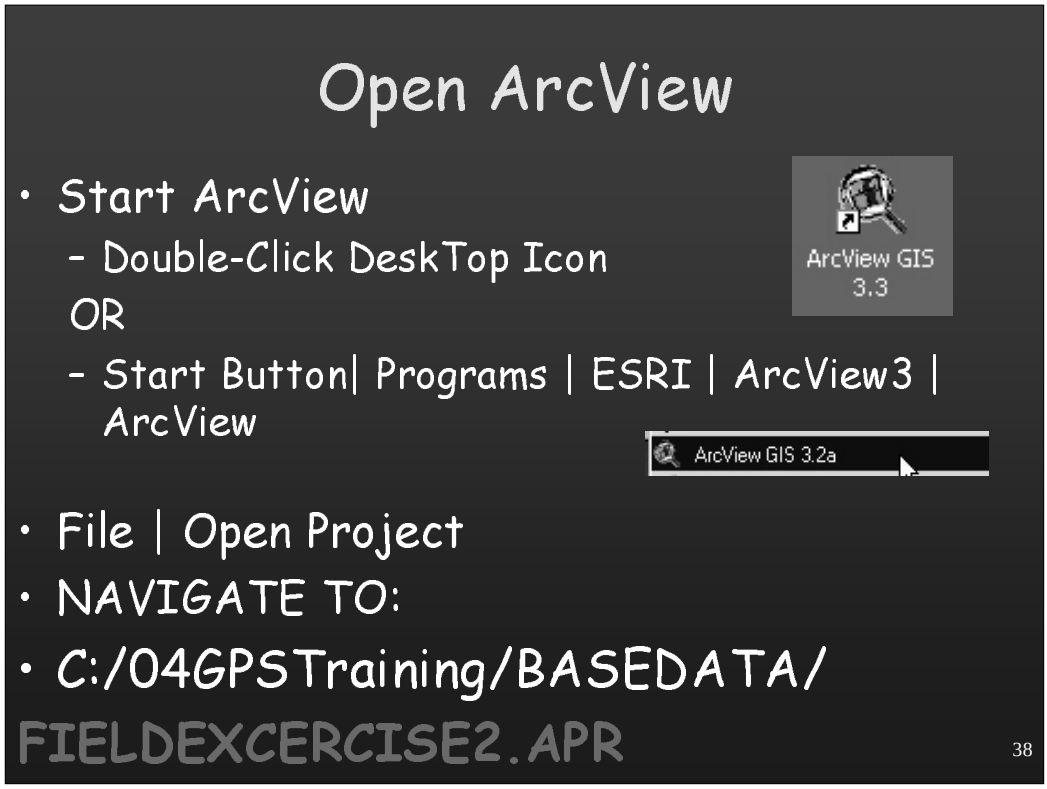


•This will complete Exercise 1. You have waypoints and tracks in your Garmin GPS. Now is the time to download and create shapes.


Exercise 2 - Main Steps
• Clear All waypoints and tracks from Garmin
• Upload Waypoints and Tracks to ArcView
• Go Outside with Exercise 2 Objectives
36

Getting Ready for Upload

- Clear All waypoints from Garmin
  - Menu Menu | Points | Waypoints | Menu | Delete All | Confirm
- Clear All Active Tracks from Garmin
  - Menu Menu | Tracks | Enter
  - Toggle Right | Clear | Confirm
- Make sure Track Recording is Off
- Menu | Setup Track Log
- Make Sure Record Mode is OFF



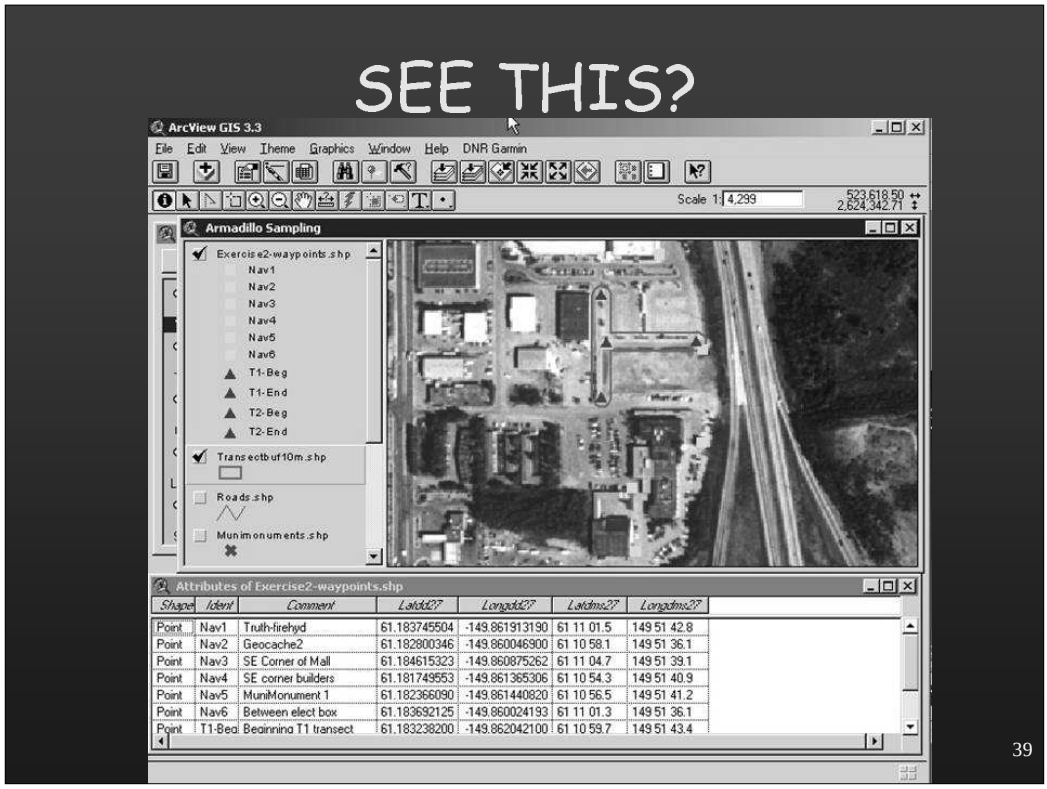
•Step 1

•Start ArcView

•Open a pre-made ArcView Project. For Training these can be found in

•For Ologists:

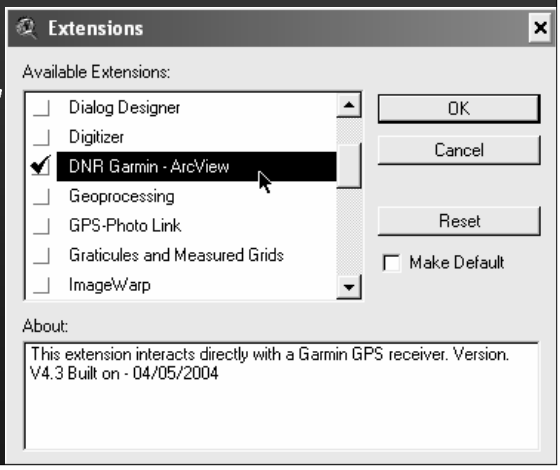
•C:/04gpstraining/basedata/field excercise2.apr

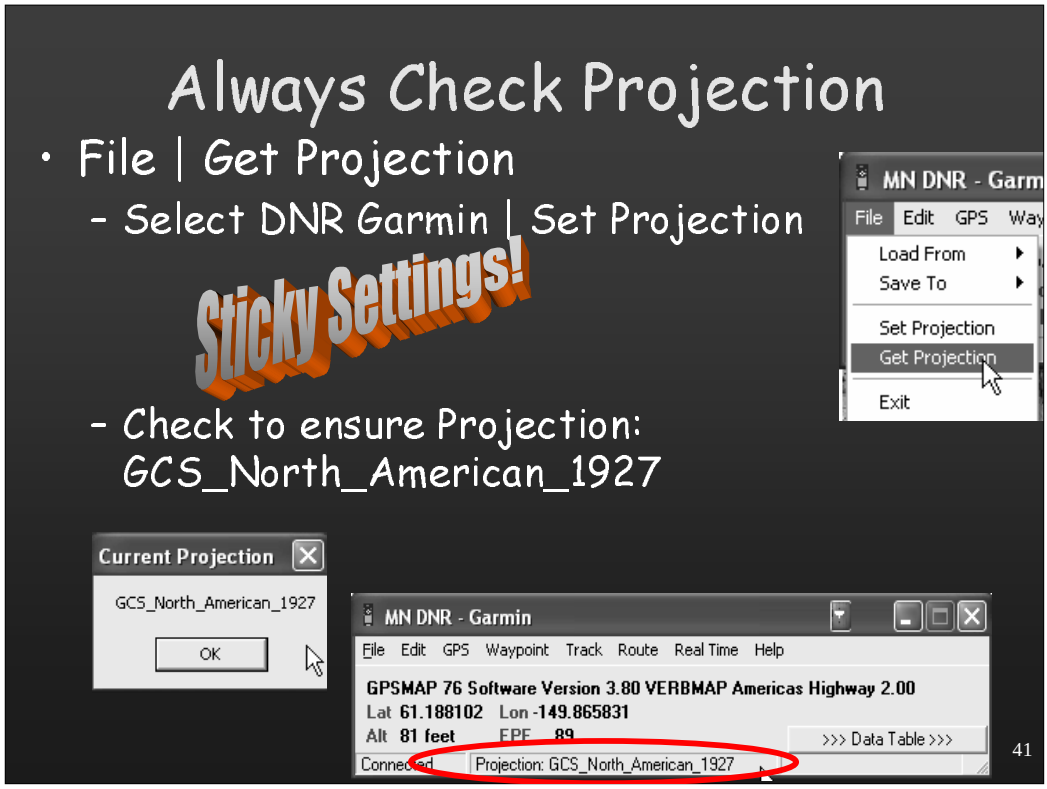


•Wait until Class sees this

Turn on DNR Garmin

- Load DNR Extension
  - Select File | Extensions...
  - Scroll to Select "DNR Garmin-ArcView"
  - Press OK





•Step 2

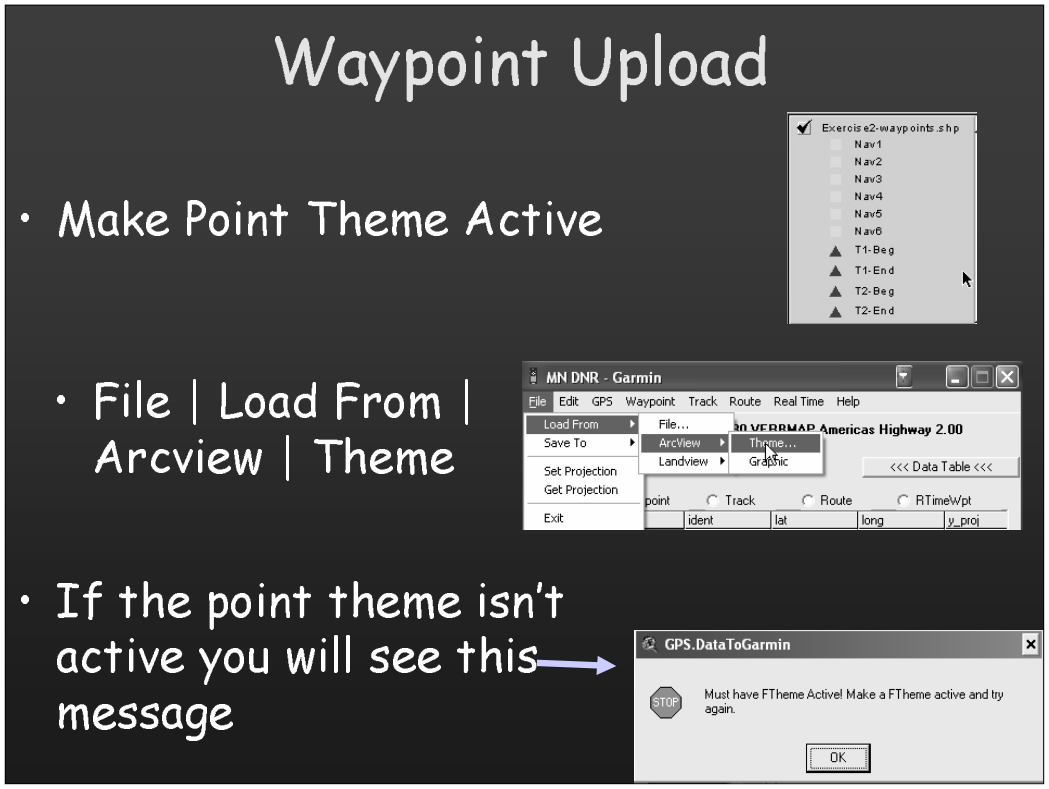
•Set Projection

•For NPS use NAD27

Reminder

- For NON NPS personnel, your projection settings may differ.
- USFWS: May be Alaska Albers or UTM Zone X
- BLM: May be Alaska Albers
- Check with your GIS Specialist!

42



Waypoint Upload: Step 1- from ArcView shapefile to DNRGarmin waypoints

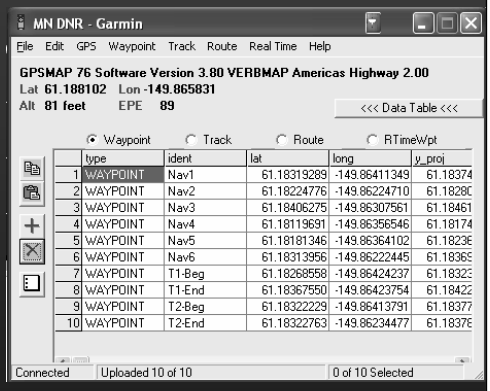
Make Point Theme Active

File | Load | Waypoints From| ArcView Theme

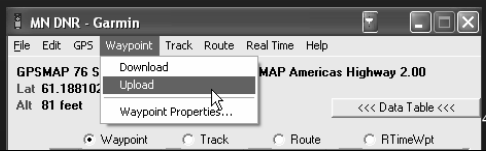
STOP error if the theme isn't active

Waypoint Upload

- Confirm 10 waypoints are in Data Table



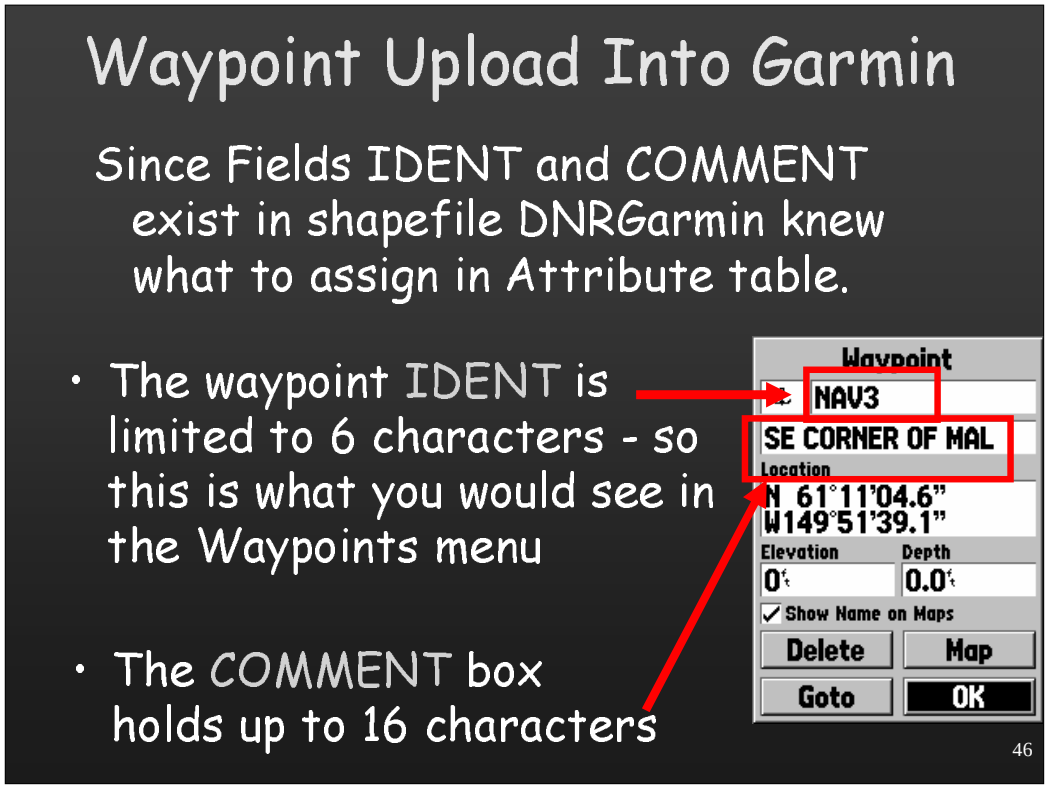
- Select Waypoint | Upload



Waypoint Upload Into Garmin

- Press OK To Confirm 10 Waypoints Uploaded to Garmin

45



Select CANCEL for IDENT field to be sequential numbers in DNRGarmin table, which becomes name of waypoint in receiver

Option: select a field from the shapefile to give a more descriptive name to the waypoint name in the receiver. E.g., name or label. You are limited to 6 characters

Waypoint Upload Into Garmin

WARNING!

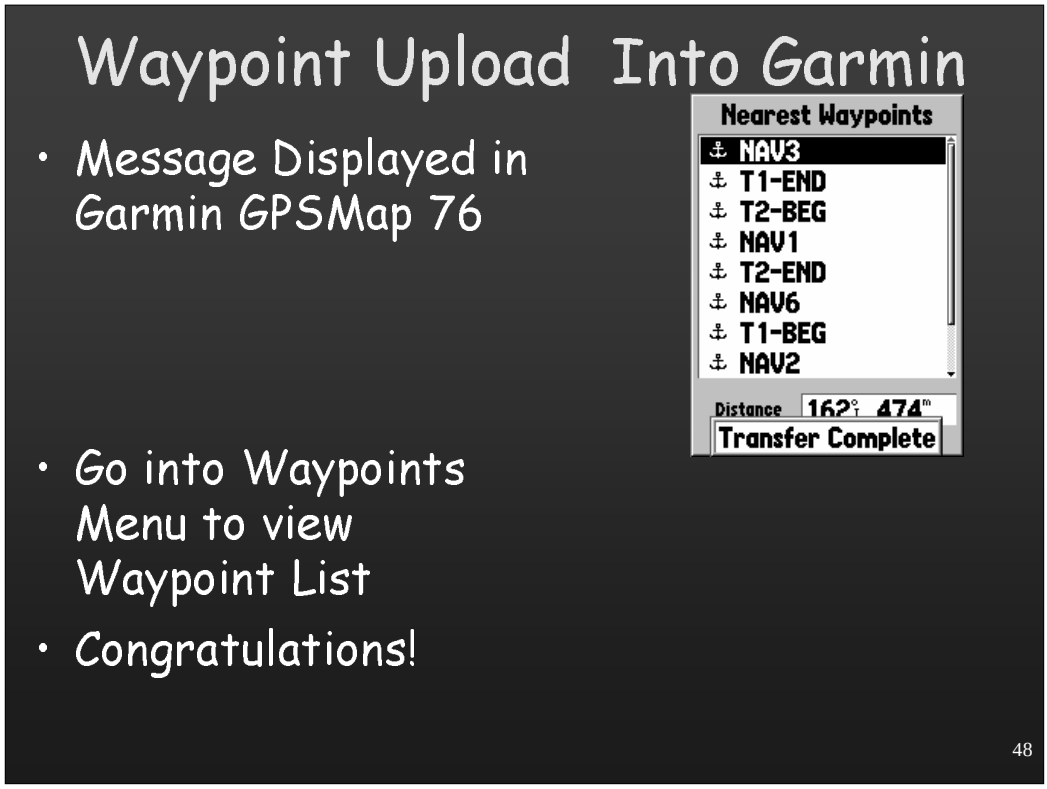
- When you upload waypoints, any waypoint in the GPS that has the same ID name as the uploading waypoint will be overwritten.
- Although this is not an issue today, it may happen to you!

47

WARNING!

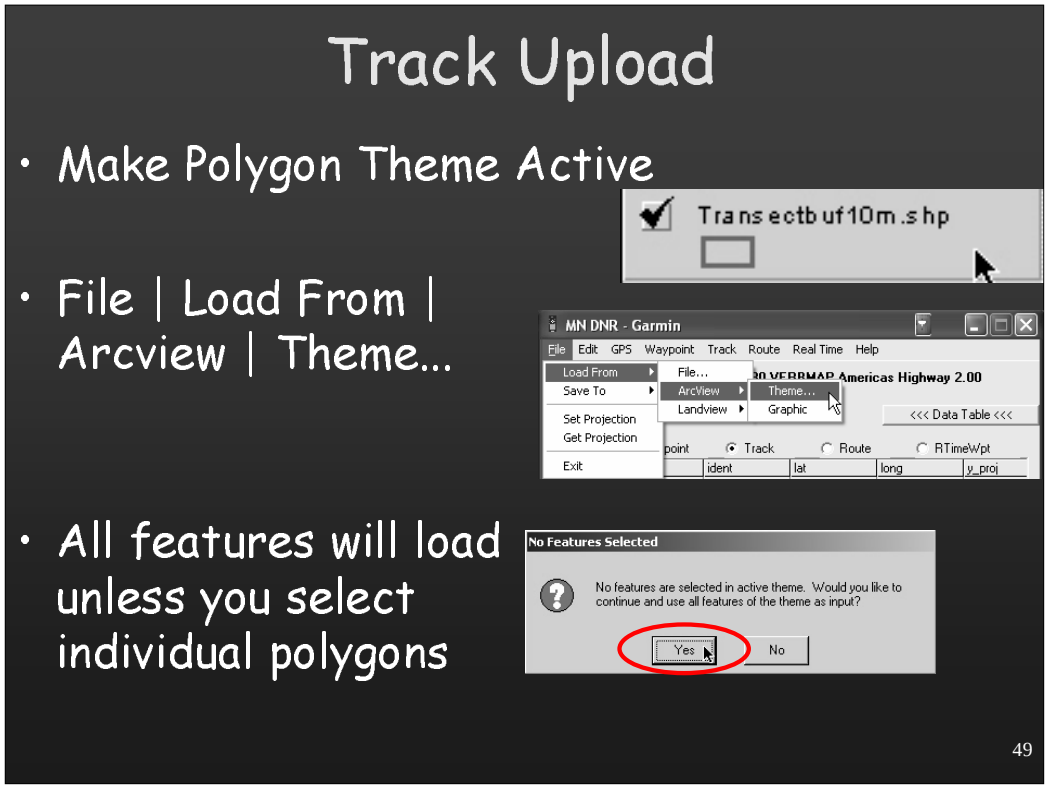
When you upload waypoints, any waypoint in the GPS that has the same ID name as the uploading waypoint will be overwritten.

Although this is not an issue today, it may happen on a fire!



This is what you will see in your receiver once the upload is finished!

Go into the Waypoints Menu to see a list of your waypoints

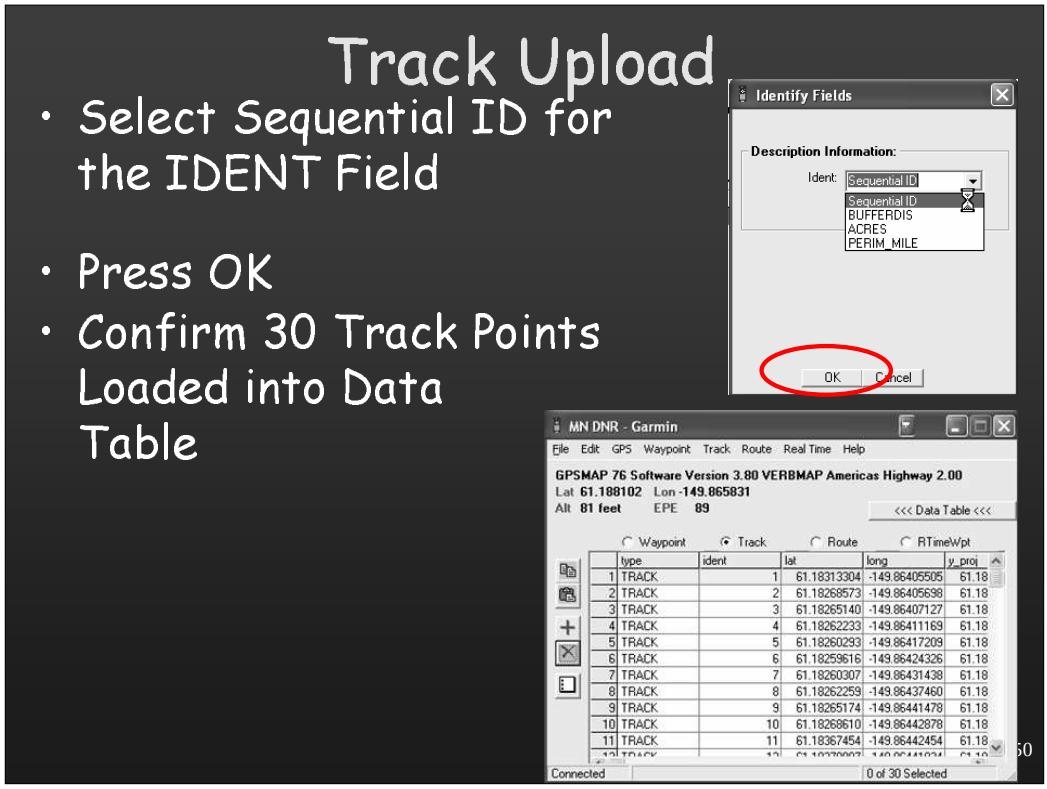


Track Upload: Step 1- from ArcView shapefile to DNRGarmin track

Make polygon theme active

File | Load | Tracks From| ArcView Theme

Note: you could select individual polygons if you want OR if none are selected the whole shapefile will load.



Track Upload: Step 2 - DNRGarmin track to receiver track

Click on the ADVANCED button

Loaded *X* tracks with *X* track points will display down at the bottom of window

Track | Upload

Transfer Complete message will pop up, click ok

Review - 2 steps

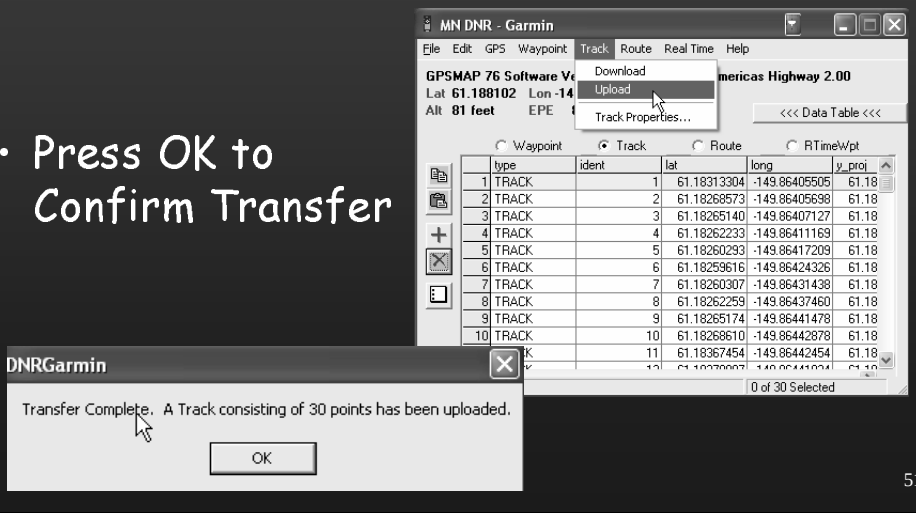
1. Load Tracks from shapefile - this puts the shapefile into DNRGarmin as tracks (with trackpoints).

2. Upload tracks - this uploads the tracks from DNRGarmin to receiver

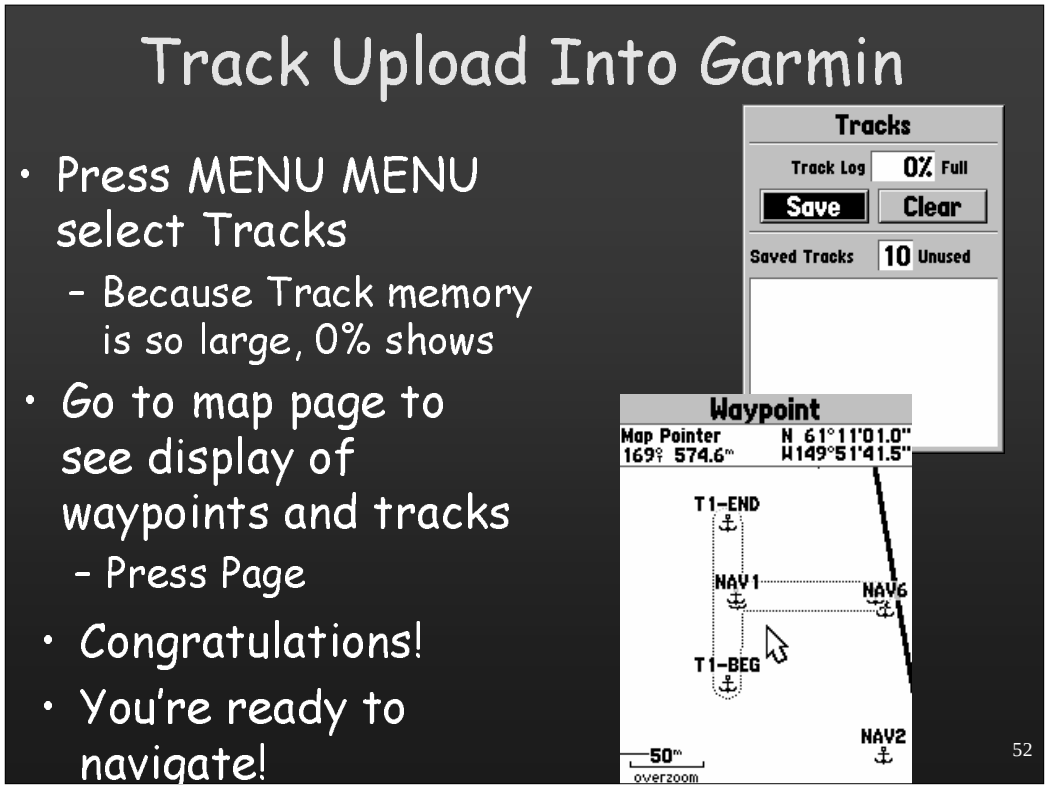
Note: Blue display for some track points in DNRGarmin table is an indication of the beginning of "separate" tracks. DNRGarmin makes this assessment with distance between series of track point collections and/or time of collection. Pretty smart software huh?!?

Track Upload into Garmin

- Select Track | Upload
- Press OK to Confirm Transfer



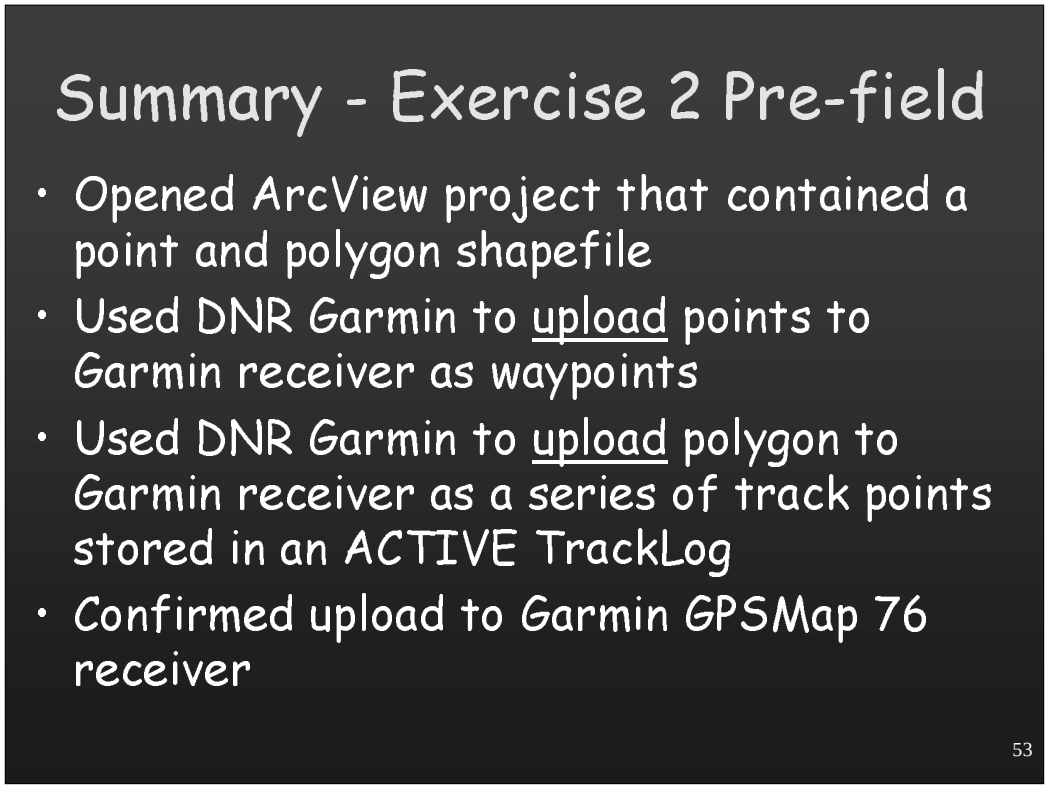
51



This is what you will see in your receiver once the upload is finished!

Go into the Track Logs Menu to see % of active log used.

Go into the Map Page to see the tracks (and waypoints).



Summary:

Opened ArcView project that contained a polygon and point shapefile

Used DNR Garmin to upload points to Garmin receiver as waypoints

Used DNR Garmin to upload polygon to Garmin receiver as tracks

Confirmed upload to receiver

Next Step - Exercise 2

- Using the Field Exercise 2 Form
- Close Down
  - the Garmin
  - DNR Garmin & ArcView
- Be sure you have all the equipment
- Meet out at Truth! (NAV1)

4

Field Exercise 2

- Back from the Field

55

Exercise 2 - Post Field

- Using the steps in this powerpoint,
- SLIDES 25 – 31
- Download and verify the Exercise 2 Data using the third ArcView project provided for you….

C:/04GPSTRAINING
/BASEDATA/
POSTFIELDEXCERCISE1.APR

Exercise 2 - Post Field

- Quick Steps
  - Open postfieldexcercise2.apr
  - Download Waypoints to ArcView
    - Transfer only waypoints you collected
  - Download Tracks to ArcView
    - Transfer only Tracks you collected
    - Download as Lines
  - Calculate migration distances for Armadillos
  - Calculate Density of Armadillos inside Transect Area (number of Animals / Area)

57

Last But Not Least

- Datum Bust
- Garmin Accuracy – LIVE DEMO

58


Conclusion
• To Inform you of GPS Tools
• To Motivate Use of Garmin GPS for many Alaska applications
• To Teach
– GPS Fundamentals
– Basic Steps in Collecting Good Data with a Garmin GPSMap76 receiver
– Plan and Execute a GPS Mission
– Download/Upload Coordinates Using DNR Garmin and ArcView
Fill out the Evaluation Form

DNR Garmin

- Other DNR Garmin Quirks and Features we will not have time to discuss in Class

60

DNR Garmin Quirks

- Since NPS works with Decimal Degree Data (not projected) there are some items that need clarification
  - 1) Chronology Player will not work with DD data.
  - 2) Shape Attribute Calculations will not work with DD data
- Simply use DNRGarmin with projected data and your fine.

61

Other Features

How to Speed Up Downloads

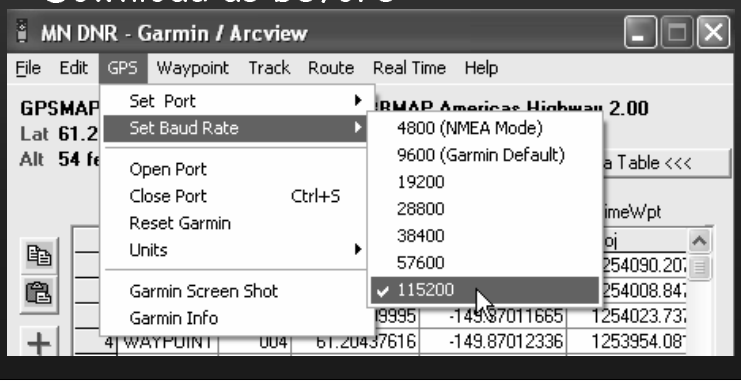
- New to Version 4.3 is increased data transfer speeds.
- Previous versions operated only at 9600 baud – now you can set the baud rate up to 11520!
- Tracks will download 10X faster
- Now offers Alaska Albers NAD27!

62

Other Features

How to Speed Up Downloads

- Here ' s how
  - Select GPS |Set Baud Rate |
    - Change to 115200
  - Download as before



63

Other Features

Independent Projection Engine

Proj.4 – Open source projection engine developed by Gerald Evenden of the USGS. Used by:

- Grass
- Mapserver
- PostGIS

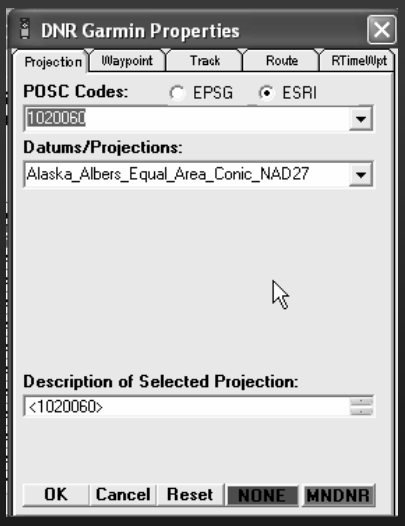
- Do not need Arcview to Open/Save projected shapefiles.

- Now offers Alaska Albers NAD27!

64

Projection – Version 4.3 now comes with Alaska Albers NAD27 – The Alaska Standard

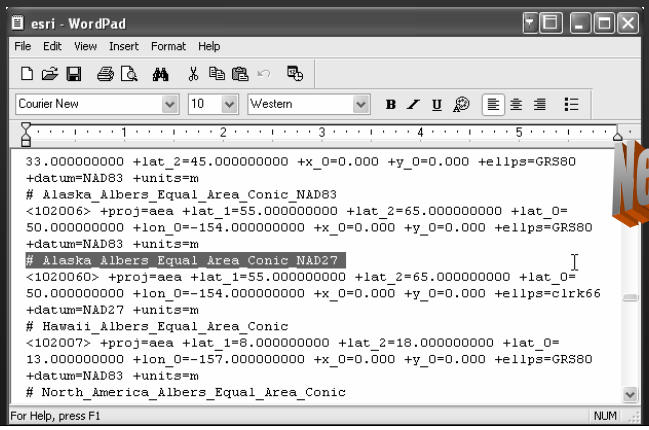
- You can now directly project out shapes in the Alaska Albers NAD27 projection.
- Previous versions we had to enter the values
- Go to Set |Projection
- Type in The ESRI code 1020060
- You will still need to create a PRJ file



65

Projection –Alaska Albers 27

- Here is a look at the entry in the C:\Program Files\dnrgarmin\proj\nad\esri file



New to 4.3!

66

Projection – Adding a Custom projection

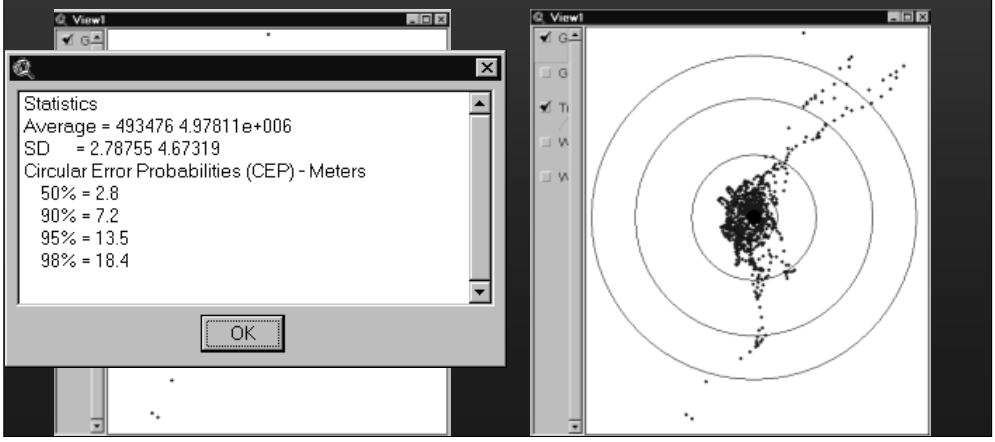
- Go to C:\Program Files\dnrgarmin\proj\nad
- Open the ESRI file with a text editor.
- You can directly edit in any custom projection information.
- Merely copy and paste a line of code
- Save file when done

67

Other Features
Calculate CEP

Circular Error of Probability

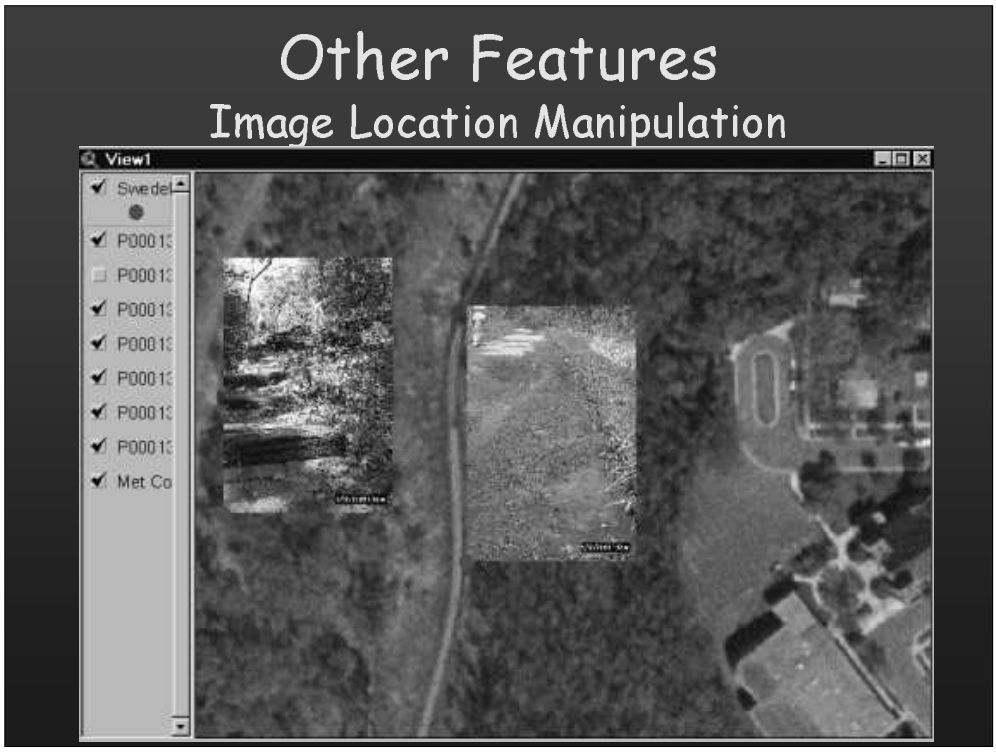
- Use to determine the accuracy of your GPS at a given location at a given time of day.



Other Features

Image Hotlinking

- Set up hotlinking for images


Other Features
Image Location Manipulation
View1
Swedel
P0001
P0001
P0001
P0001
P0001
P0001
P0001
Met Co

Other Features

Image Location Manipulation